PB90-114794

Superfund Record of Decision (EPA Region 5): Miami County Incinerator, OH. (First Remedial Action), June 1989

(U.S.) Environmental Protection Agency, Washington, DC

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U.S. Department of Commerce
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Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-89/094
June 1989

PB90-114794

EPA

Superfund Record of Decision:

Miami County Incinerator, OH

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REPORT DOCUMENTATION PAGE

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Miami County Incinerator, OH
First Remedial Action - Final

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6.

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401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered 800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Miami County Incinerator site is in Concord Township, Ohio. The 65-acre site is approximately 1500 feet west of the Great Miami River; the Eldean Tributory of the river runs across the northwest corner of the site. The site consists of the incinerator building and adjacent property, including a former scrubber wastewater lagoon, an ash disposal pit, an ash pile, a liquid disposal area, and trench and fill landfill areas north and south of the Eldean Tributory. Operations began in 1968, when large quantities of spent solvents, oils, and drummed and bulk industrial sludges were accepted for disposal. The facility generated scrubber wastewater and ash quench water, which were disposed of in the wastewater lagoon. Incinerator fly ash and bottom ash, non-combustible materials, and unburned refuse were disposed of in a landfill north of the tributary, and an estimated 104,000 to 150,000 barrel-equivalents of liquid waste were dumped or buried onsite. After closure of the facility in 1983, the Ohio EPA found detectable levels of chlorinated hydrocarbons in drinking water wells near the site. Three residences, the Miami County Highway Garage, and the incinerator facility were supplied with alternate water supplies in 1986. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, toluene, and TCE; other organics including PCBs, PAHs, dioxin, and pesticides; and metals including lead.

(See Attached Sheet)

con't on pg ii

17. Document Analysis a. Descriptors

Record of Decision - Miami County Incinerator, OH
First Remedial Action - Final
Contaminated Media: gw, soil
Key Contaminants: VOCs (TCE, PCE, toluene), organics (PAHs, PCBs, dioxin), metals (lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None

20. Security Class (This Page) None

21. No. of Pages 150

22. Price

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R05-89/094
Miami County Incinerator, OH
First Remedial Action - Final

Con't from p9.

not included.

16. Abstract (continued)

The selected remedial actions for this site are specific to each area of contamination and include excavation and onsite consolidation of ash wastes and contaminated soils onto the landfills with capping of landfills and previously excavated areas; pumping and treatment of ground water with discharge to POTW; vapor/vacuum extraction of liquid disposal area using carbon filters; continued testing of soils, ash, and tributary sediment; and provision of an alternate water supply for area residents and businesses. The estimated present worth for this remedial action is $19,400,000, which includes an estimated O&M cost of $4,666,000.

ATTENTION

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DIRECT QUESTIONS RESULTING FROM ILLEGIBILITY TO:

U.S. EPA
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Record of Decision

Site Name and Location

Miami County Incinerator
Troy, Ohio

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Miami County Incinerator site developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan to the extent practicable.

This decision is based upon the contents of the administrative record for the Miami County Incinerator site.

The State of Ohio concurrence with the selected remedy is expected.

Description of the Remedy

This site has seven areas of concern. The selected remedial alternative for each of these areas is:

A. South Landfill - closure according to State sanitary landfill requirements. Alternative A3 has been selected. The major components of the selected alternative are:

- Fence landfill area and post warning signs
- Deed notifications/property use restrictions to prohibit use of groundwater and prevent exposure to contaminants
- Ongoing monitoring
- Grade and cap landfill with single barrier cap

B. North Landfill - closure according to State sanitary landfill requirements. Alternative B3 has been selected. The major components of the selected alternative are:

- Fence landfill area and post warning signs
- Deed notification/property use restrictions to prohibit use of groundwater and prevent exposure to contaminants
- Ongoing monitoring
- Grade and cap landfill with single barrier cap

C. Ash Disposal Pit and Ash Pile - remove to North or South Landfill. Alternative C3 or C4 has been selected depending on the need for treatment. The major components of the selected alternative are:

- Excavation and consolidation of ash wastes and contaminated soils onto the North or South Landfill
- Backfill and vegetate excavated areas
- Treatment if required under RCRA

D. Liquid Disposal Area and Groundwater - vapor extraction, groundwater pump and treatment, capping. Alternative D4A which is modification of Alternative D4 has been selected. The major components of the selected alternative are:

- Ongoing monitoring
- Grade and cap site with double barrier cap
- Vacuum extraction of VOCs from waste and soils
- Vapor phase carbon treatment or equivalent, catalytic oxidation or other appropriate treatment of the exhaust
- Pump and treat contaminated groundwater with discharge to Troy POTW with pretreatment, if necessary
- Continue connection of residential and commercial groundwater users to a potable water supply

E. Former Scrubber Wastewater Lagoon Test soils/ash for complete CLP organic/inorganic parameters including cyanide compounds. An evaluation will then be conducted to determine if any further actions are required. The same type of evaluation as conducted in the Endangerment Assessment (EA) for other site areas will be conducted. If required, the contaminated material would be removed, treated if necessary and placed in the North Landfill. Cleanup, if necessary, would be to background levels of lead and any other contaminants of concern which are identified.

F. Stained Soil Area - no action. This area has a low level of some contaminants but the risks associated with these contaminants do not warrant further action.

G. Eldean Tributary Testing of sediments will be conducted to determine the source of contaminants in the area. Samples will be analyzed for base-neutral compounds, pesticides, PCBs and cyanide. An evaluation will then be conducted to determine if any further actions are required. The same type of evaluation as conducted in the Endangerment Assessment (EA) for other site areas will be conducted. Results will be compared to standards and criteria to see if there would be an effect on the aquatic community. Cleanup of this area, if necessary, would be to a hazard index of less than one for non-carcinogens and to a 10^{-6} total lifetime risk level for carcinogens via direct contact. Cleanup would also be protective of the aquatic community.

H. Groundwater Users - connection to City of Troy water supply. Because of the contamination of residential wells by organic chemicals, these residences are being connected to the City of Troy water supply with the consent of the well owners. The wells with higher levels of contaminants belonging to residences and business in the area have been taken out of service because of the acute threat involved. The remaining residences have water which poses a chronic health threat that is clearly unacceptable over the longer term. Once these residences are connected to city water, the wells should be closed to prevent their use and possible cross contamination of the city water supply. New wells should not be drilled until the aquifer has been cleaned up and the groundwater can be considered safe for human consumption. The length of time this will take cannot now be estimated but it can be anticipated that it will take many years.

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, I have determined that, at the Miami County Incinerator site, the selected remedial alternative is cost-effective, provides adequate protection of public health, welfare and the environment, and utilizes treatment to the maximum extent practicable.

The action will require operation and maintenance activities to ensure continued effectiveness of the remedial alternative as well as to ensure that the performance meets applicable State and Federal surface and ground-water criteria.

I have determined that the action being taken is consistent with Section 121 of SARA. The State of Ohio has been consulted on the selected remedy and their concurrence is expected.

Declaration

The selected remedy is protective of human health and the environment and attains Federal and State requirements that are applicable or relevant and appropriate to this remedial action and is cost effective.

This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Treatment was not found to be practicable for the landfill portion of the site, thus this remedy does not employ treatment for this area.

Because this remedy will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Valdas V. Adamkus
Regional Administrator

June 30th, 1989
Date

DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

The Miami County Incinerator site is located on 65 acres of county-owned land in Concord Township, about 2 miles north of the City of Troy and 5 miles south of the city of Piqua. (See figures 1 and 2). It is in an area of rolling terrain about 1,500 feet west of the Great Miami River. The Eldean Tributary enters the site just below the northwest corner and exits just north of the Sheriff's Hall. From that point, the creek flows east and discharges to the Great Miami River.

The site consists of the incinerator building and adjacent property. Areas of interest include a former scrubber wastewater lagoon, an ash disposal pit, an ash pile, liquid disposal area, and trench and fill landfill areas north and south of the Eldean Tributary. The surrounding county-owned land is occupied by the County Highway Department garage and the Sheriff's Hall and Training Center. A road salt storage building standing on a concrete slab is west of the County Highway Department main building.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Miami County Incinerator was constructed in 1967. Aerial photographs indicate that uncontrolled waste disposal had been taking place at the site before that time. When the incinerator began operating in 1968, it generated by-products that included scrubber wastewater and ash quench water, which were disposed of in the wastewater lagoon, and incinerator fly ash, bottom ash, noncombustible materials, and unburned refuse, which were disposed of elsewhere at the site.

Based on review of historic aerial photographs, landfill operations at the site appear to have begun in 1968 with the excavation of a pit (the "North Landfill") due west of the incinerator across the railroad tracks. Incinerator fly ash and bottom ash, noncombustible materials, and unburned refuse are thought to have been disposed of in the North Landfill and the Ash Disposal Pit. Early landfill operations appear to have been limited to the area north of the Eldean Tributary, but by the end of 1973 they had begun in the area south of the tributary. Neither an engineered liner nor a leachate collection system were installed at the site. The trench and fill operations continued into 1978.

The facility accepted large quantities of spent solvents, oils, and drummed and bulk industrial sludges for disposal in an area bounded roughly by the B&O Railroad tracks on the east and the property boundary on the north. The liquid wastes were either dumped on the ground or buried. Estimates of the total quantity of liquid waste accepted vary from 104,000 to 150,000 barrel-equivalents.

-5-a

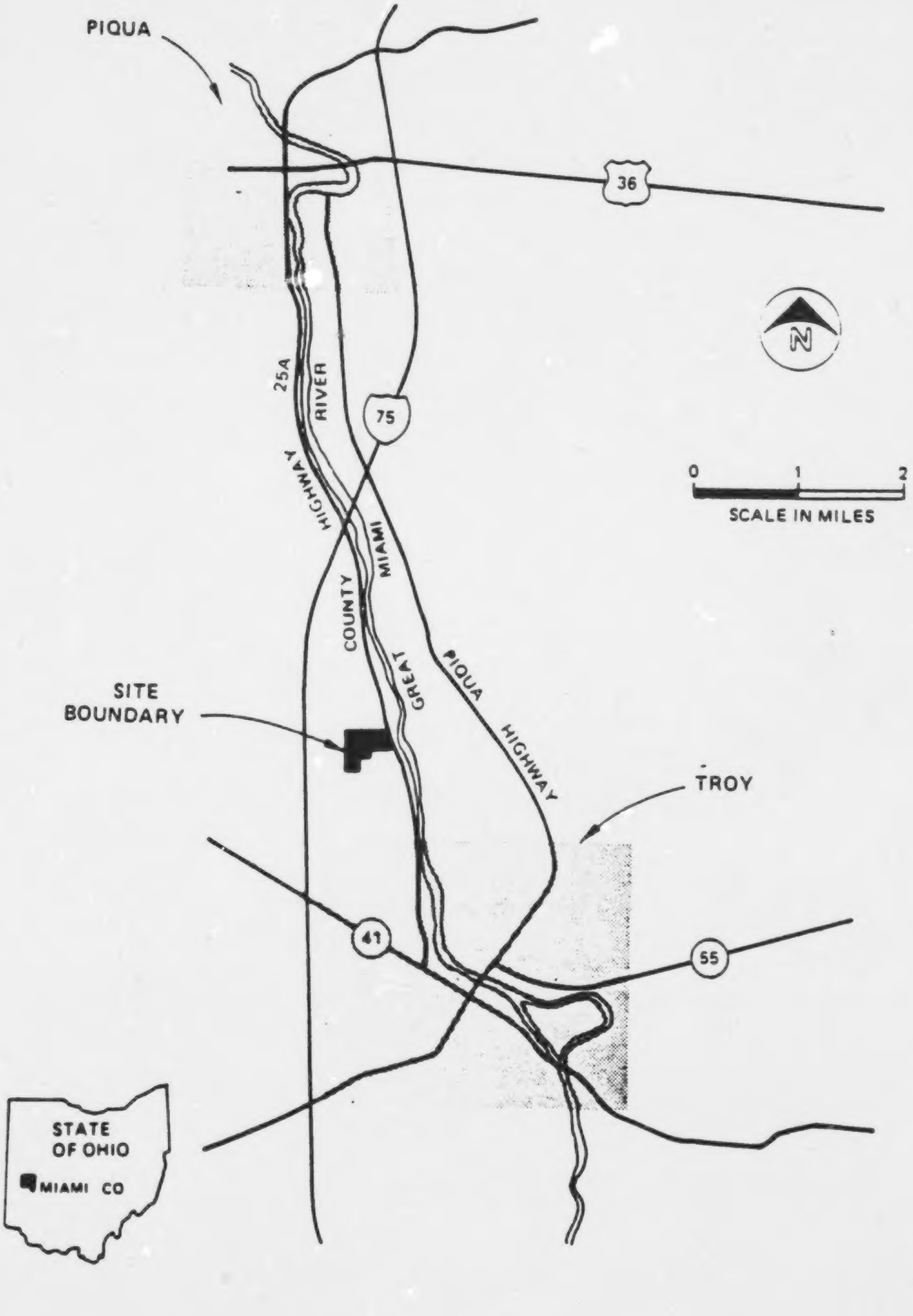
PIQUA
36
25A
RIVER
HIGHWAY
75
N
0
1
2
SCALE IN MILES
COUNTY
MIAMI
GREAT
PIQUA
HIGHWAY
SITE BOUNDARY
TROY
41
55
STATE OF OHIO
MIAMI CO

FIGURE 1
SITE LOCATION MAP
MIAMI COUNTY INCINERATOR
RECORD OF DECISION

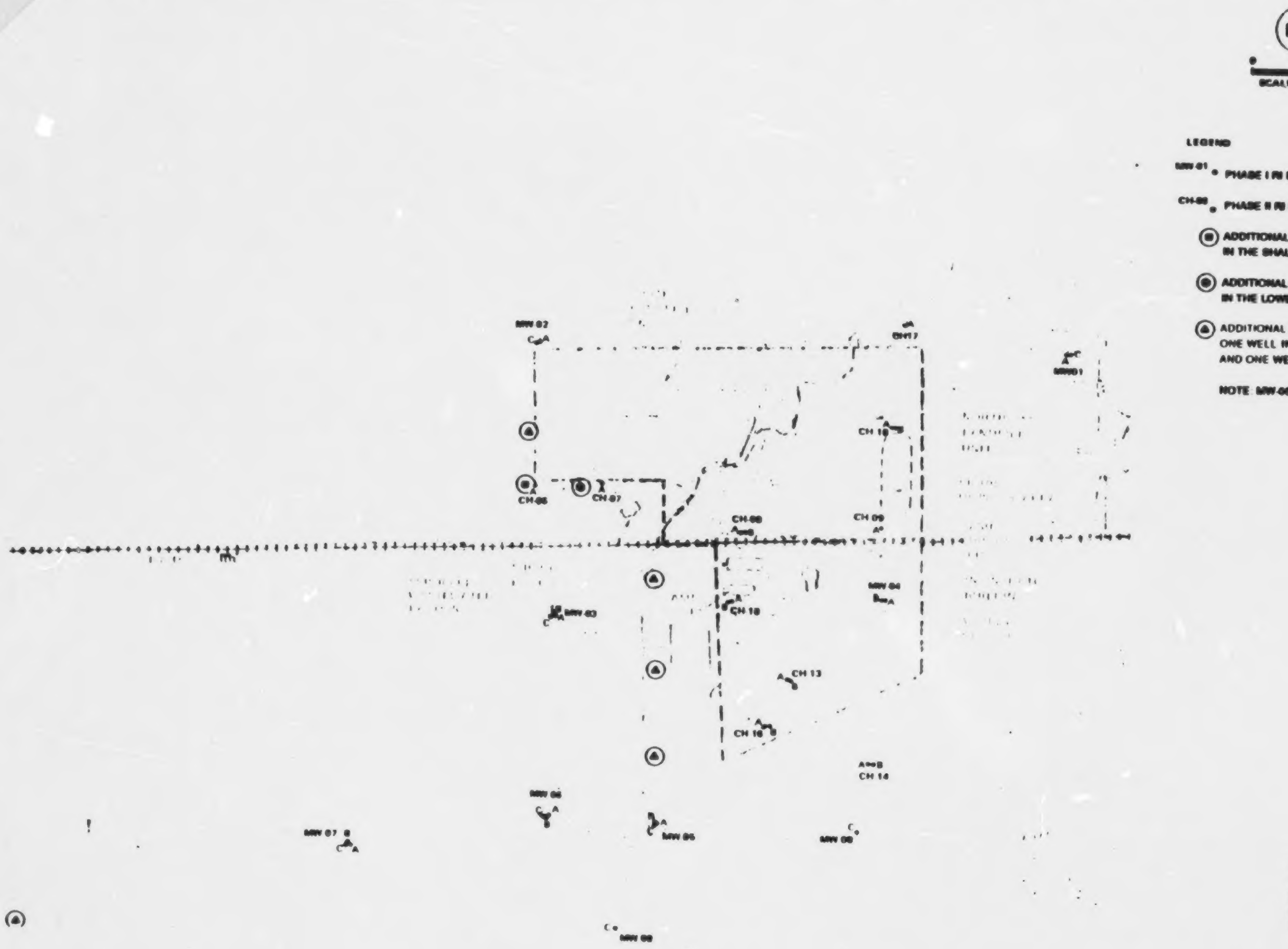
N
0
500
SCALE IN FEET
LEGEND
MW-01 ● PHASE I RI MONITORING WELLS
CH-08 ● PHASE II RI MONITORING WELLS
ADDITIONAL MONITORING WELL TO BE INSTALLED IN THE SHALLOW AQUIFER
ADDITIONAL MONITORING WELL TO BE INSTALLED IN THE LOWER AQUIFER
ADDITIONAL MONITORING WELL CLUSTER, WITH ONE WELL IN THE UPPER AQUIFER, AND ONE WELL IN THE LOWER AQUIFER
NOTE: MW-06B INSTALLED DURING PHASE II RI
MW 02
CH17
MW01
CH 19
CH-06
CH-07
CH-08
CH 09
MW 04
CH 10
MW 03
CH 13
CH 16
CH 14
MW 06
MW 05
MW 08
MW 07
MW 09

FIGURE 3
ADDITIONAL MONITORING WELL INSTALLATIONS
MIAMI COUNTY INCINERATOR
RECORD OF DECISION

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In 1973, Ohio EPA found groundwater samples from onsite and nearby water supply wells to be contaminated with organic solvents and ordered the facility to cease disposal of liquid waste by April 19, 1974. Some liquid waste disposal (packing house waste) continued until March 1975. By 1976, the Liquid Disposal Area had been covered. After closure of the facility in 1983, three residential wells on the east side of County Highway 25-A across from the site were found to contain detectable levels of chlorinated hydrocarbons. All three residences, the Miami County Highway Garage, and the incinerator facility were supplied with municipal water from the City of Troy in 1986.

Disposal of incinerator residue apparently continued at the northern portion of the landfill into 1978. In 1978, the Scrubber Wastewater Lagoon was closed and, according to the Miami County Sanitation Department, the fly ash sludge was removed from the bottom of the lagoon although testing was not conducted to determine that the contaminants were removed from the area. Some of that material is believed to have been spread on the northern portion of the landfill. Some of the ash sludge was piled east of the lagoon, where it is still present in the area referred to as the Ash Pile. In October 1978, the incinerator facility was converted to a solid waste transfer station.

ENFORCEMENT STATUS

On March 27, 1989, RD/RA special notice letters were mailed to approximately 150 PRPs. The PRP steering committee, the Business and Industry Environmental Committee (BIEC), notified U.S. EPA by letter dated April 13, 1989, and presented a formal offer to voluntarily undertake remedial action at the site. Negotiations between U.S. EPA and the BIEC are ongoing.

III. COMMUNITY RELATIONS

A public meeting was held in Troy, Ohio on September 10, 1986 to discuss the first phase of the Remedial Investigation. A second public meeting was held on April 6, 1989. The final Remedial Investigation (RI) report, the Endangerment Assessment, the Feasibility Study (FS) report and the Proposed Plan were discussed at the meeting. Following a question and answer session, a formal opportunity for making public comments was held. All of these documents as well as the administrative record were available for review at the Miami County Public Library and at the Miami County Commissioner's Office.

A public comment period on the Proposed Plan was held from March 27, 1989 to April 26, 1989. Comments were accepted by mail as well as at the public meeting. All of these comments were considered when the Record of Decision was prepared. A responsiveness Summary which includes responses to all of the comments received, was compiled and is attached.

IV. SCOPE AND RULE OF RESPONSE ACTION

The selected remedial alternatives for the Miami County Incinerator site will address all of the contaminant problems identified in the Endangerment Assessment. The alternatives for the Former Scrubber Wastewater Lagoon and the Eldean Tributary involve additional testing. Any actions required as a result of this testing will be completed as a part of this Remedial Action.

V. SITE CHARACTERISTICS

Contaminants of potential concern for the endangerment assessment were selected in a two-step process from the more than 80 chemicals detected at the site during the RI.

The first step of the selection process entailed selecting all chemicals that have either a published critical toxicity factor (i.e., cancer potency factor or reference dose) or an environmental media standard or criteria. Fifty-three chemicals detected at the site that met this selection criterion are presented in Table 1.

Thirty of the contaminants detected at the site are classified as known, probable, or possible human carcinogens by the U.S. EPA Carcinogen Assessment Group (Table 2). The EPA uses a weight-of-evidence approach to classify the likelihood of a chemical to be a human carcinogen. The potential for a chemical to be a human carcinogen is inferred from the available information relevant to the potential carcinogenicity of the chemical and from judgments as to the quality of the available studies.

Noncarcinogenic health effects include a variety of toxic effects on organ systems (e.g., renal toxicity—toxicity to the kidney), on chromosomal material (mutagenicity), and on developing fetuses (teratogenicity). A classification of the contaminants of concern by general category of noncarcinogenic effects is presented in Table 3. Since chemicals classified as potential carcinogens are also capable of causing noncarcinogenic effects, some chemicals identified as potential carcinogens on Table 2 may be on Table 3 as well.

Exposure to these contaminants may occur when contaminants migrate from the site to an exposure point (i.e., a location where receptors can come into contact with contaminants) or when a receptor comes into direct contact with waste or contaminated media at the site. An exposure pathway is complete if there is a way for the receptor to take in contaminants through ingestion, inhalation, or dermal absorption of contaminated media or waste.

The actual and potential exposure pathways for the incinerator site are:

- Contaminant migration through groundwater, resulting in exposure of groundwater users downgradient from the site.
- Contaminant migration through groundwater, resulting in the discharge of contaminants to the Great Miami River and subsequent exposure of aquatic organisms
- Development of the site, resulting in exposure of future onsite groundwater users
- Exposure of trespassers through direct contact with surface contaminants
- Exposure of wildlife through direct contact with surface contaminants
- Development of the site, resulting in exposure of future site users through direct contact with contaminants exposed during development

Groundwater Use Exposure Pathways

A contaminant plume extends south and southeast of the landfill. Human exposure to contaminants can occur through the use of contaminated groundwater as a drinking water supply. In residences, people can be exposed to contaminants through ingestion of the water used for drinking and cooking. They may also be exposed through dermal absorption of contaminants, primarily during bathing and showering, and inhalation of volatile compounds released from the water into the household air during showering, bathing, cooking, or by the use of household appliances such as water heaters and washing machines. Employees and patrons of businesses that use the groundwater may also be exposed.

The earliest detection of contamination in groundwater was at the incinerator production well in 1973. Subsequent sampling of monitoring wells and residential wells has indicated that contaminants have migrated offsite through the groundwater in an east-southeasterly direction.

There are 27 residences between the site and the Great Miami River along County Highway 25-A. There are also eleven non-residential water users near the site (seven businesses along 25-A, the ball diamond, incinerator building, county highway garage, and the sheriff's department). Analysis of residential wells sampled in 1985 indicated that contaminants were present in 15 area wells.

Based on groundwater modelling, groundwater from the site discharges to the Great Miami River within approximately 3/4 mile to 1 mile south of the site. Consequently, groundwater related exposures should be limited to those individuals within that distance from the site using groundwater for water supply. The City of Troy well fields are 2.5 miles south of the site and would not be affected by contaminants released from the site.

Surface Water Exposure Pathways

The shallow groundwater discharges to the Great Miami River. Contaminants from the site are thought to be discharging to the Great Miami River, although none has been detected in the river by sampling.

The discharge of contaminants to the river could result in the exposure of the aquatic organisms as well as terrestrial wildlife. Aquatic organisms in the river could come into contact with contaminants in solution or sorbed to solids. They may also be exposed when water containing the chemicals passes over gill surfaces, when the water is ingested, or when they ingest other organisms that have incorporated contaminants.

The first mechanism is termed "bioconcentration"; the mechanism associated with dietary intake may be termed "bioaccumulation." Terrestrial organisms that feed on aquatic organisms that have incorporated contaminants may also be exposed, as would people who consume fish from the river.

Soil and Sediment Exposure Pathways

The direct contact exposure pathway involves the physical contact of receptors with the waste material or contaminated soil. The routes of exposure associated with direct contact are typically ingestion and dermal absorption. Direct contact exposures can occur in several situations at the site.

Current Conditions. Trespassers could be exposed to contaminants in the site surface soil and sediments in the Eldean Tributary since the creek is seasonally dry. Access to the site is limited somewhat by a fence across the entrance to the transfer station and by the operation of the transfer station. Although the public is not allowed on the site during the hours of operation of the transfer station, they might trespass after hours or on the weekend. During the RI field work, people were observed entering the site along the railroad tracks that traverse the site. There was also evidence of hunting (e.g., spent shells and signs with bullet holes). It is possible that children play at the site although there is no documentation of this.

Terrestrial wildlife, such as small mammals, can come into contact with contaminated soil, sediments, ingest plants that have taken up contaminants or become coated with contaminated dust, or ingest other organisms previously exposed to contaminants.

Site Development. Development of the site for residential, recreational, or commercial purposes could present situations in which people would have direct contact with contaminants. The degree of exposure potential any of these situations depends on the specific use of the site.

If the site is used for recreation, such as a park, exposure could occur from contact with contaminants on the site surface. Such exposure would be similar to that expected under the trespass setting with two major differences. Park development may require landscaping, including the laying of sod for play fields, which could limit contact with contaminated soil. However, a park may attract more people to the site than the number who would come to an undeveloped piece of land.

Both commercial and residential development of the site would require the excavation of subsurface material for building foundations and utility lines. Excavation could expose buried waste and contaminated soil.

The degree of potential contact with contaminants resulting from site development depends on:

- The location and extent of the excavation
- The deposition of excavated material (left onsite or taken offsite for disposal)
- The amount of material excavated
- The particular type of site use

Commercial or light industrial development such as a shopping plaza, office park, or warehouse would have a relatively low direct contact potential. Access to contaminants would be limited because much of the site would be covered by buildings and parking lots. Potentially exposed individuals would most likely be maintenance personnel.

A residential site use would have a greater potential for direct exposure than other uses. Gardens and lawns may provide ready access to contaminants present in the surface soil. People can be exposed through a variety of outdoor activities including gardening by adults and play activities by children. Studies at other superfund sites have indicated that contaminant levels in indoor dust are similar to these found in contaminated outdoor soil. Therefore, direct contact exposures may occur year round. Small children (toddlers) are most likely to be exposed in the indoor setting.

VI. SUMMARY OF SITE RISKS

The Miami County Incinerator site is releasing contaminants to the environment. Chapter 7 of the RI entitled "Endangerment Assessment" presents the results of a comprehensive risk assessment that addresses the potential threats to public health and the environment posed by the Site under current and future conditions assuming that no remedial actions take place and that no restrictions are placed on future use of the site.

Over fifty contaminants of concern were evaluated in the risk assessment. These contaminants are listed in Table 1. The risk assessment also summarized the toxicity of and hazards associated with exposure to contaminants of concern. These hazards are summarized in Tables 2 through 11.

ACTUAL AND POTENTIAL EXPOSURE PATHWAYS

The endangerment assessment identified actual and potential exposure pathways associated with the site under current site uses and pathways associated with site development. The following exposure pathways were identified as pathways of actual and potential concern for the site under the no-action alternative:

- Exposure through use of contaminated groundwater as a water supply
- Direct contact with contaminated surface soil by trespassers onto the site
- Exposure of future site occupants to contaminants currently in the subsurface soil if, as part of site development, the contaminated media are excavated and left on the site surface.

GROUNDWATER EXPOSURES

A zone of contaminated groundwater extends from the site east and southeast toward the Great Miami River. Based on an evaluation of groundwater concentrations detected during the RI, use of both the upper and lower aquifers as water supply sources east and southeast of the site pose an actual and potential health risk.

Excess lifetime cancer risks based on the mean (arithmetic) contaminant concentrations detected were 3×10^{-2} (ingestion) to 5×10^{-3} (inhalation) for the groundwater onsite to 6×10^{-3} (ingestion) to 1×10^{-3} (inhalation) for the upper aquifer downgradient from the site and 3×10^{-3} (ingestion) to 5×10^{-4} (inhalation) for the lower aquifer downgradient from the site. Onsite is defined as inside the property boundary. The primary chemicals contributing to the risk levels are vinyl chloride, trichloroethene, methylene chloride and tetrachloroethene. Noncarcinogenic risk, as evaluated by comparison of estimated daily intakes to reference dose, is limited to the onsite area. The noncarcinogens present in concentrations of concern are toluene, antimony and barium (detected once in round 1).

TABLE 1
CONTAMINANTS OF POTENTIAL CONCERN
MIAMI COUNTY INCINERATOR SITE

- • Acetone
- • Aldrin
- • Antimony
- • Arsenic
- • Barium
- • Benzene
- Benzo[a]anthracene
- Benzo[b]fluoranthene
- Benzo[k]fluoranthene
- • Benzo[a]pyrene
- • Beryllium
- • Bis(2-ethylhexyl)phthalate
- • 2-Butanone
- • Cadmium
- • Carbon disulfide
- • Chlorobenzene
- • Chlordane
- • Chromium
- Chyrsene
- • Copper
- DDD
- DDE
- • DDT
- Dibenzo[a,h]anthracene
- • Dibutyl phthalate
- • 1,1-Dichloroethane
- • 1,2-Dichloroethane
- • 1,1-Dichloroethene
- • 1,2-Dichloroethene
- • Dieldrin
- • Diethyl phthalate
- • Dioxins
- • Ethylbenzene
- • Hexachlorobenzene
- Indeno[1,2,3-cd]pyrene
- • Isophorone
- • Lead
- • Manganese
- • Mercury
- • Methylene chloride
- • 4-Methyl-2-pentanone
- • 2-Methylphenol
- • 4-Methylphenol
- • Nickel
- • N-Nitrosodiphenylamine
- • Pentachlorophenol
- • Phenol
- • PCB
- • Selenium
- • Silver
- • Styrene
- • Tetrachloroethene
- • Thallium
- • Toluene
- • 1,2,4-Trichlorobenzene
- • 1,1,1-Trichloroethane
- • Trichloroethene
- • Vanadium
- • Vinyl chloride
- • Xylenes
- • Zinc

• Contaminants of potential concern selected based on availability of cancer potency factor, reference dose, or environmental criteria.

The greatest risk levels are directly downgradient from the Liquid Disposal Area. Areas of lower risk are south of the site between Route 25-A and the Great Miami River. The groundwater directly east of the South Landfill does not appear to be contaminated.

Residential Wells. Potential noncarcinogenic risks and carcinogenic risks for residential wells were estimated and the results are summarized in Table 4. Only the incinerator well, which is no longer in use, had a hazard index greater than one for ingestion of toluene. Seven wells had detectable concentrations of carcinogens. The excess lifetime cancer risk associated with a lifetime exposure to carcinogens at the concentrations detected in the wells ranged from 1×10^{-4} to 2×10^{-7} for ingestion and from 4×10^{-4} to 4×10^{-8} for inhalation.

Monitoring Wells. The risk evaluation was based upon highest detected concentration in an aquifer or area, the mean concentration for the aquifer or area, and individual well concentrations. For some wells there are several rounds of monitoring data, in which case data were averaged together because there are no clear, consistent temporal trends. The carcinogenic risk associated with the highest detected and mean concentrations are summarized in Table 5.

Risk estimates for the source area groundwater range from 1×10^{-1} to 1×10^{-3} for ingestion and 2×10^{-2} to 3×10^{-4} for inhalation. Risk estimates for both downgradient groundwater systems range from 7×10^{-2} to 4×10^{-4} for ingestion and 1×10^{-2} to 9×10^{-5} for inhalation. The primary carcinogen determining the risk estimates is vinyl chloride. Methylene chloride, bis(2-ethylhexyl)phthalate, n-nitrosodiphenylamine, tetrachloroethene, and trichloroethene also are present at levels greater than 1×10^{-6}.

Noncarcinogenic risks are summarized in Table 6. Hazard indices for antimony and toluene are above unity in the source area for the highest detected concentrations, and above unity for mean concentrations of antimony. In the downgradient zones, the hazard index for highest detected concentration is above unity because of barium. However, barium was detected only at elevated levels in the first rounds. In the latest round, the barium concentration was below any level of concern.

Residential wells concentrations which exceed drinking water standards, criteria and guidelines are summarized in Table 7. Monitoring well concentrations which exceed drinking water standards, criteria and guidelines are summarized in Table 8.

Potential Current Soil Exposures

Exposures under current conditions (i.e., resulting from trespassing) would be limited to exposure to contaminants present in the surface soil. For this evaluation, the site was divided into two major subareas--the areas north and south of the Eldean Tributary. The north

TABLE 2
POTENTIAL CARCINOGENS
MIAMI COUNTY INCINERATOR SITE

Chemical	U.S. EPA Carcinogen Assessment Group Classification	
	Ingestion	Inhalation
Aldrin	B2	B2
Arsenic	A	A
Benzene	A	A
Benzo[a]anthracene	B2	B2
Benzo[b]fluoranthene	B2	B2
Benzo[k]fluoranthene	B2	B2
Benzo[g,h,i]perylene	B2	B2
Benzo[a]pyrene	B2	B2
Beryllium	B1	B1
Bis(2-ethylhexyl)phthalate	B2	B2
Cadmium	D	B1
Chlordane	B2	B2
Chromium	D	A
Chrysene	B2	B2
DDD	B2	B2
DDE	B2	B2
DDT	B2	B2
1,2-Dichloroethane	B2	B2
1,1-Dichloroethene	C	C
Dieldrin	B2	B2
Hexachlorobenzene	B2	B2
Indeno[1,2,3-cd]pyrene	C	C
Methylene chloride	B2	B2
N-Nitrosodiphenylamine	B2	B2
Nickel	D	A
PCB	B2	B2
2,3,7,8-TCDD	B2	B2
Tetrachloroethene	B2	B2
Trichloroethene	B2	B2
Vinyl chloride	A	A

NOTE: U.S. EPA Carcinogen Assessment Group (CAG) Classification.

Group A	Human carcinogen - Sufficient evidence from epidemiological studies.
Group B1	Probable human carcinogen - At least limited evidence of carcinogenicity to humans.
Group B2	Probable human carcinogen - Combination of sufficient evidence in animals and inadequate data in humans.
Group C	Possible human carcinogen - Limited evidence of carcinogenicity in animals in the absence of human data.
Group D	Not classified - Inadequate animal evidence of carcinogenicity.

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TABLE 3
NONCARCINOGEN CRITERIA
MIAMI COUNTY INCINERATOR SITE

CHEMICAL	(a) REPRODUCTIVE TOXICITY OR TERATOGENICITY	(b) MUTAGENICITY	(c) ACUTE TOXICITY	(d) CHRONIC EFFECT
Acetone	-	-	-	-
Aldrin	X	X	X	X
Antimony	X	X	X	-
Arsenic	X	X	X	X
Barium	X	-	X	-
Benzene	X	X	-	X
Benzo[a]anthracene	-	X	-	-
Benzo[b]fluoranthene	-	-	-	-
Benzo[k]fluoranthene	-	-	-	-
Benzo[a]pyrene	X	X	-	-
Beryllium	-	-	-	X
Bis(2-ethylhexyl)phthalate	X	-	-	-
2-Butanone	X	-	-	-
Cadmium	X	-	-	X
Carbon disulfide	-	-	-	-
Chlordane	X	X	-	X
Chlorobenzene	-	-	-	-
Chromium	X	-	-	X
Chrysene	-	-	-	-
Copper	-	-	-	-
DDE	X	-	-	X
DDD	X	-	-	X
DDT	X	-	-	X
Dibenzo[a,h]anthracene	-	X	-	-
Dibutylphthalate	X	-	-	X
1,1-Dichloroethane	-	-	-	-
1,2-Dichloroethane	-	X	-	X
1,1-Dichloroethene	X	X	-	-
1,2-Dichloroethene	-	-	-	-
Dieldrin	X	X	-	-
Diethyl phthalate	X	X	-	-
Ethylbenzene	X	-	-	-
Hexachlorobenzene	X	-	-	X
Lead	X	-	-	X
Manganese	-	X	-	-
Mercury	X	X	X	X
Methylene chloride	-	X	-	-
4-Methyl-2-pentanone	-	-	-	-

(See page 2 for footnotes)

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TABLE 3
NONCARCINOGEN CRITERIA
MIAMI COUNTY INCINERATOR SITE

CHEMICAL	(a) REPRODUCTIVE TOXICITY OR TERATOGENICITY	(b) MUTAGENICITY	(c) ACUTE TOXICITY	(d) CHRONIC EFFECT
Methyl phenol	-	-	-	-
Nickel	X	-	-	X
Pentachlorophenol	X	-	-	-
Phenol	-	-	-	-
PCB	X	-	-	-
Selenium	X	-	X	-
Silver	-	-	X	-
Styrene	-	-	-	-
2,3,7,8-TCDD	X	-	X	X
Tetrachloroethene	X	X	-	-
Thallium	-	-	X	-
Toluene	X	-	-	-
Trichlorobenzene	-	-	-	-
1,1,1-Trichloroethane	-	X	-	-
Trichloroethene	-	X	-	-
Vanadium	-	-	X	-
Xylene	X	-	-	-
Zinc	-	-	-	-

NOTE: Adopted from "Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites," Office of Waste Programs Enforcement (OWPE), U.S. EPA 1985. Criteria presented below is that of OWPE. An "X" indicates the chemical meets the criteria outlined by OWPE for the particular toxic effect classification. The lack of an "X" under a classification does not necessarily imply that the chemical cannot have a toxic effect. Note, not all chemicals of concern were evaluated in the OWPE document.

(a) Chemicals are classified as teratogens and reproductive toxins if there is suggestive evidence of an effect in humans or if at least one study in whole animals is clearly positive. Unsupported in vitro evidence is considered sufficient to classify a chemical as as a reproductive toxicity/teratogenicity hazard.

(b) A chemical is classified as mutagenic if it has given a positive result in at least one of the mammalian in vivo or mammalian cell in vitro assays for mutagenicity.

(c) A compound is considered to be acutely toxic if it has an oral LD50 < or = 100 mg/kg, an inhalation LC50 < or = 400 mg/cubic meter, or a dermal LD50 < or = 400 mg/kg.

(d) Chemicals will be considered to cause chronic toxicity if they cause serious irreversible effects other than cancer or reproductive effects after extended exposure to oral doses of less than 100 mg/kg/day, inhalation concentrations < 100 mg/kg/day, inhalation concentrations less than 400 mg/cubic meter, or dermal doses less than 100 mg/kg/day.

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TABLE 4
SUMMARY OF RISKS – RESIDENTIAL WELLS
MIAMI COUNTY INCINERATOR SITE

WELL	INGESTION HAZARD INDEX	INHALATION HAZARD INDEX	INGESTION EXCESS LIFETIME CANCER RISK	INHALATION EXCESS LIFETIME CANCER RISK	CHEMICAL	CONCENTRATION (ug/l)
RW01	0.760	0.042	1E-04	4E-04	1,1-Dichloroethene [B2]	7.5
RW05	0.120	0.031	8E-07	1E-06	Trichloroethene [B2]	2.6
RW07	0.002	0.003	-	-	No Carcinogens Detected	
RW08	0.057	0.016	2E-07	3E-07	Trichloroethene [B2]	0.6
RW11	2.200 Toluene (a)	0.910	-	-	No Carcinogens Detected	
RW13	0.370	0.002	-	-	No Carcinogens Detected	
RW14	0.370	0.008	-	-	No Carcinogens Detected	
RW17	0.140	0.006	-	-	No Carcinogens Detected	
RW19	0.004	0.005	-	-	No Carcinogens Detected	
RW20	0.004	0.006	-	-	No Carcinogens Detected	
RW25	0.029	0.043	2E-07	3E-07	Trichloroethene [B2]	0.5
RW31	0.180	(b)	3E-07	4E-07	Trichloroethene [B2]	0.8
			2E-06	2E-07	Tetrachloroethene [B2]	1.2
RW34	0.370	(b)	4E-07	4E-08	Tetrachloroethene [B2]	0.3
RW36	0.008	0.012	9E-07	2E-06	Trichloroethene [B2]	3.0
			2E-05	2E-06	Tetrachloroethene [B2]	15.0

NOTE: Residential well assessment based on highest concentrations detected in residential well. See Volume II of the Remedial Investigation Report, Appendix I, Tables I-1 through I-20A.

Exposure assumptions: 70kg body weight; daily exposure; ingestion of 2 liters/day; inhalation exposures are assumed to be 150% of ingestion exposures.

(a) Estimated daily intake of toluene greater than its RfD by a factor of 1.6
(b) No volatile noncarcinogens, consequently no inhalation hazard index calculated.

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TABLE 5

SUMMARY OF CANCER RISKS FOR GROUNDWATER BASED ON MONITORING WELLS
MIAMI COUNTY INCINERATOR SITE

Chemical and U.S. EPA Carcinogen Assessment Group Classification	Highest Detected Concentration (ug/L)	Well/ Round	Ingestion: Excess Lifetime Cancer Risk	Inhalation: Excess Lifetime Cancer Risk	Arithmetic Mean Concentration (ug/L)	Ingestion: Excess Lifetime Cancer Risk	Inhalation: Excess Lifetime Cancer Risk	Geometric Mean Concentration (ug/L)	Ingestion: Excess Lifetime Cancer Risk	Inhalation: Excess Lifetime Cancer Risk
SOURCE AREA GROUNDWATER (a)										
Arsenic [A]	14.7	CH09A/3	7E-04	-	7.4	4E-04	-	6.5	3E-04	-
Methylene chloride [B2]	330	CH08A/3	7E-05	2E-04	84	2E-05	5E-05	8.5	2E-06	6E-06
Trichloroethene [B2]	82	CH18A/3	2E-05	4E-05	17	6E-06	1E-05	5.0	2E-06	3E-06
Vinyl chloride [A]	1550	CH08A/3	1E-01	2E-02	390	3E-02	6E-03	21	1E-03	3E-04
Total w/ Arsenic	-		1E-01	-	-	3E-02	-	-	2E-03	-
Total w/out Arsenic (b)	-		1E-01	2E-02	-	3E-02	6E-03	-	1E-03	3E-04
UPPER GROUNDWATER AQUIFER DOWNGRADIENT (c)										
Arsenic [A]	27.6	CH10A/3	1E-03	-	7.4	4E-04	-	6.3	3E-04	-
Bis(2-ethylhexyl)phthalate [B2]	21	MW07A/2	8E-06	-	-	-	-	-	-	-
1,2-Dichlorothane [B2]	3	MW04A/3	8E-06	1E-05	-	-	-	-	-	-
Methylene chloride [B2]	62	MW04A/1	1E-05	4E-05	8.3	2E-06	5E-06	3.6	6E-07	2E-06
N-Nitrosodiphenylamine [B2]	20	MW03A/3	3E-06	-	-	-	-	-	-	-
Tetrachloroethene [B2]	130	CH10A/3	2E-04	2E-05	-	-	-	-	-	-
Trichloroethene [B2]	8.7	MW04A/1	3E-06	5E-06	3.5	1E-06	2E-06	3.2	1E-06	2E-06
Vinyl chloride [A]	1100	CH13A/3	7E-02	1E-02	89	6E-03	1E-03	10	7E-04	1E-04
Total w/ Arsenic	-		7E-02	-	-	6E-03	-	-	1E-03	-
Total w/out Arsenic (b)	-		7E-02	1E-02	-	6E-03	1E-03	-	7E-04	1E-04
LOWER GROUNDWATER AQUIFER DOWNGRADIENT (d)										
Arsenic [A]	19.4	MW05C/3	1E-03	-	7.3	4E-04	-	6.3	3E-04	-
Bis(2-ethylhexyl)phthalate [B2]	370	MW04B/3	1E-04	-	29	1E-05	-	7.4	3E-06	-
Methylene chloride [B2]	21	MW06C/1	4E-06	1E-05	4.6	1E-06	3E-06	3.3	7E-07	2E-06
N-Nitrosodiphenylamine [B2]	10	MW06C/3	1E-06	-	-	-	-	-	-	-
Trichloroethene [B2]	36	MW04B/3	1E-05	2E-05	6	2E-06	3E-06	3.4	1E-06	2E-06
Vinyl chloride [A]	780	CH14B/3	6E-02	1E-02	39	3E-03	6E-04	6.7	4E-04	9E-06
Total w/ Arsenic	-		6E-02	-	-	3E-03	-	-	6E-04	-
Total w/out Arsenic (b)	-		6E-02	1E-02	-	3E-03	6E-04	-	4E-04	9E-05

NOTE: See Volume II of the Remedial Investigation Report, Appendix I, Tables I-82 through I-84.
Exposure assumptions: 70 kg body weight; daily exposure; ingestion of 2 liters/day; inhalation is 150% of intake through ingestion.

(a) Source area groundwater estimated from wells: CH09A, CH18A, CH08B, CH18B.
(b) Evaluation of carcinogenicity of arsenic in drinking water is currently being evaluated by U.S EPA. All arsenic concentrations are below current MCL of 50 ug/l.
(c) Upper aquifer estimated from wells: MW04A, MW05A, MW06A, MW07A, CH10A, CH13A, CH13B, CH14A.
(d) Lower aquifer estimated from wells: MW04B, MW05B, MW05C, MW06B, MW06C, MW07B, MW07C, CH10B, CH14B, CH16A, CH16B.

TABLE 6
SUMMARY OF NONCARCINOGENIC RISKS FOR GROUNDWATER BASED ON MONITORING WELLS
MIAMI COUNTY INCINERATOR SITE

Chemical	Highest Detected Concentration (ug/L)	Well/ Round	Ingestion Hazard Index	Inhalation Hazard Index	Arithmetic Mean Concentration (ug/L)	Ingestion Hazard Index	Inhalation Hazard Index	Geometric Mean Concentration (ug/L)	Ingestion Hazard Index	Inhalation Hazard Index
SOURCE AREA GROUNDWATER (a)										
TOTAL	-	-	8.1 (d)	2.8 (e)	-	3.7	0.67	-	2.9	0.03
Antimony	75	CH08B/3	6.4	-	41	2.9	-	38	2.7	-
Toluene	14600	CH09A/3	1.4	0.41	3600	0.34	0.1	22	0.032	0.0006
UPPER GROUNDWATER AQUIFER DOWNGRADIENT (b)										
TOTAL	-	-	0.87	0.21	-	0.24	0.04	-	0.19	0.017
LOWER GROUNDWATER AQUIFER DOWNGRADIENT (c)										
TOTAL	-	-	3.2	0.03	-	0.34	0.006	-	0.212	0.004
Barium	3150	MW04B/1	1.8	-	440	0.26	-	290	0.17	-

NOTE: See Volume II of the Remedial Investigation Report, Appendix I, Tables I-85 through I-87.
Exposure assumptions: 70 kg body weight; daily exposure; ingestion of 2 liters/day; inhalation is 150% of intake through ingestion.

(a) Source area groundwater estimated from wells: CH09A, CH18A, CH08B, CH18B.
(b) Upper aquifer estimated from wells: MW04A, MW05A, MW06A, MW07A, CH10A, CH13A, CH13B, CH14A.
(c) Lower aquifer estimated from wells: MW04B, MW05B, MW05C, MW06B, MW06C, MW07B, MW07C, CH10B, CH14B, CH16A, CH16B.
(d) Hazard index for all chemicals, not just those listed as exceeding individual hazard indexes.
(e) Hazard index for sum of chemicals is greater than 1, however, no individual chemical's hazard index is greater than 1. Aggtregating and and summing chemicals by similar effect does not yield a hazard index greater than 1.

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TABLE 7
SUMMARY OF RESIDENTIAL WELL CONCENTRATIONS THAT EXCEED DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES
MIAMI COUNTY INCINERATOR SITE

WELL	DATE	CHEMICAL	CONCENTRATION (ug/l)	CRITERIA EXCEEDED	CRITERIA LEVEL
RW01	Oct. 1985	1,1-Dichloroethene	7.5	MCL	7
				MCLG	7
				WQC-RISK	0.033
	Nov. 1984	Lead	5.7	MCL-PROP	5
				MCLG-PROP	0
RW02	Nov. 1984	Lead	6.1	MCL-PROP	5
				MCLG-PROP	0
RW03	Nov. 1984	Lead	10.4	MCL-PROP	5
				MCLG-PROP	0
RW04	Nov. 1984	Lead	6.4	MCL-PROP	5
				MCLG-PROP	0
RW05 •	Nov. 1984	trans-1,2-Dichlorethene	350	MCLG-PROP	70
		Trichloroethene	2.2	MCLG	0
RW08	May 1985	Trichloroethene	0.6	MCLG	0
RW11 •	May 1985	Arsenic	14	WQC-RISK	0.0025
		4-Methylphenol	45	WQC-TOX	0.1
		Nickel	59	WQC-TOX	15.4
		Toluene	18,000	MCLG-PROP	2,000
				WQC-TOX	15,000
				DWHA	10,100
		Ethylbenzene	1,200	MCLG-PROP	680
		Xylene	3,700	MCLG-PROP	440
				DWHA	400
RW13	May 1985	Nickel	22	WQC-TOX	15.4
RW14	May 1985	Arsenic	5.2	WQC-RISK	0.0025
RW25	May 1985	Trichloroethene	0.5	MCLG	0
RW31	Oct. 1985	Tetrachloroethene	1.2	MCLG-PROP	0
				WQC-RISK	0.88
		Trichloroethene	0.8	MCLG	0
RW34	Oct. 1985	Tetrachloroethene	0.3	MCLG-PROP	0
RW36	Oct. 1985	Tetrachloroethene	15	MCLG-PROP	0
				WQC-RISK	0.88
		Trichloroethene	3	MCLG	0
				WQC-RISK	2.8

NOTE: Comparison based on highest detected concentration in residential well.

CRITERIA KEY
MCL: Maximum Contaminant Level
MCLG: Maximum Contaminant Level Goal
MCLG-PROP: Maximum Contaminant Level Goal - Proposed
WQC-TOX: Water Quality Criteria - Toxicity Protection - Drinking Water
WQC-RISK: Water Quality Criteria @ 1E-06 Cancer Risk - Drinking Water
DWHA: Drinking Water Health Advisories (Lifetime)

• Well no longer in service.

TABLE 8
SUMMARY OF MONITORING WELL CONCENTRATIONS THAT EXCEED DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES
MIAMI COUNTY INCINERATOR SITE

Well	RI Round	Chemical	Concentration (ug/l)	Criteria Exceeded	Criteria Level
MW03-A	3	N-Nitrosodiphenylamine	20.0	WQC-RISK	4.9
MW04-A	1	Vinyl chloride	55.5	MCL	2
				MCLG	0
				WQC-RISK	2
		Trichloroethene	8.7	MCL	5
				MCLG	0
				WQC-RISK	2.8
		Benzene	2.7	MCLG	0
				WQC-RISK	0.67
		Tetrachloroethene	4.5	MCLG-PROP	0
				WQC-RISK	0.8
		Arsenic	5.5	WQC-RISK	0.0025
	2	Trichloroethene	7.5	MCL	5
				MCLG	0
				WQC-RISK	2.8
		Arsenic	10.2	WQC-RISK	0.0025
		Lead	12.0	DWHA	10
				MCL-PROP	5
				MCLG-PROP	0
	3	1,2-Dichloroethane	3.0	MCLG	0
				WQC-RISK	0.94
		Arsenic	14.4	WQC-RISK	0.0025
MW04-B	1	Vinyl chloride	13.0	MCL	2
				MCLG	0
				WQC-RISK	2
		Trichloroethene	8.0	MCL	5
				MCLG	0
				WQC-RISK	2.8
		Barium	3150.0	MCL	1000
				MCLG-PROP	1500
				DWHA	1800

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TABLE 8
SUMMARY OF MONITORING WELL CONCENTRATIONS THAT EXCEED DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES
MIAMI COUNTY INCINERATOR SITE

Well	RI Round	Chemical	Concentration (ug/l)	Criteria Exceeded	Criteria Level
		Cadmium	6.5	MCLG-PROP	5
	2	Vinyl chloride	10.0	MCL	2
				MCLG	0
				WQC-RISK	2
		Trichloroethene	17.0	MCL	5
				MCLG	0
				WQC-RISK	2.8
		Barium	1630.0	MCL	1000
				MCLG-PROP	1500
	3	Trichloroethene	36.0	MCL	5
				MCLC	0
				WQC-RISK	2.8
MW05-C	2	Arsenic	17.0	WQC-RISK	0.0025
	3	Arsenic	19.4	WQC-RISK	0.0025
MW06-A	1	Trichloroethene	4.5	MCL	5
				MCLG	0
				WQC-RISK	2.8
	2	Trichloroethene	3.0	MCL	5
				MCLG	0
				WQC-RISK	2.8
		Lead	5.6	MCL-PROP	5
				MCLG-PROP	0
	3	N-Nitrosodiphenylamine	8.0	WQC-RISK	4.9
MW06-B	1	Arsenic	4.1	WQC-RISK	0.0025
MW06-C	1	Arsenic	8.5	WQC-RISK	0.0025
	3	N-Nitrosodiphenylamine	10.0	WQC-RISK	4.9
MW07-B	2	Lead	13.0	DWHA	10
				MCL-PROP	5
				MCLG-PROP	0
MW07-C	1	Beryllium	1.1	WQC-RISK	0.39
	3	N-Nitrosodiphenylamine	9.0	WQC-RISK	4.9
CH9A	3	Vinyl Chloride	1550.0	MCL	2
				MCLG	0
				WQC-RISK	2

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TABLE 8
SUMMARY OF MONITORING WELL CONCENTRATIONS THAT EXCEED DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES
MIAMI COUNTY INCINERATOR SITE

Well	RI Round	Chemical	Concentration (ug/l)	Criteria Exceeded	Criteria Level
		Trans-1,2-Dichloroethene	3150.0	MCLG-PROP	70
				DWHA	350
		1,1,1-Trichloroethane	1250.0	MCL	200
				MCLG	200
				DWHA	1000
		Toluene	14500.0	MCLG-PROP	2000
				DWHA	10100
		Ethylbenzene	910.0	MCLG-PROP	680
		Xylenes (total)	7450.0	MCLG-PROP	440
				DWHA	2200
		4-Methylphenol	14.5	WQC-O.C.	0.1
		Arsenic	14.7	WQC-RISK	0.0025
		Nickel	35.5	WQC-TOX	15.4
CH10A	3	Trichloroethene	5.0	MCL	5
				MCLG	0
				WQC-RISK	2.8
		Tetrachloroethene	130.0	MCLG-PROP	0
				WQC-RISK	0.8
		Arsenic	27.6	WQC-RISK	0.0025
CH10B	3	Tetrachloroethene	7.0	MCLG-PROP	0
				WQC-RISK	0.8
		Arsenic	17.5	WQC-RISK	0.0025
CH13B	3	Vinyl chloride	1100.0	MCL	2
				MCLG	0
				WQC-RISK	2
		Trans-1,2-dichloroethene	2500.0	MCLG-PROP	70
				DWHA	350
		Nickel	26.0	WQC-TOX	15.4

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TABLE 8
SUMMARY OF MONITORING WELL CONCENTRATIONS THAT EXCEED DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES
MIAMI COUNTY INCINERATOR SITE

Well	RI Round	Chemical	Concentration (ug/l)	Criteria Exceeded	Criteria Level
CH14A	3	Vinyl chloride	200.0	MCL	2
				MCLG	0
				WQC-RISK	2
		Trans-1,2-dichloroethene	2000.0	MCLG-PROP	70
				DWHA	350
CH14B	3	Vinyl chloride	760.0	MCL	2
				MCLG	0
				WQC-RISK	2
CH16A	3	Nickel	37.0	WQC-TOX	15.4
CH16B	3	Nickel	39.0	WQC-TOX	15.4
CH18A	3	Trichloroethene	62.0	MCL	5
				MCLG	0
				WQC-RISK	2.8
CH18B	3	Nickel	33.0	WQC-TOX	15.4

CRITERIA KEY

MCL:	Maximum Contaminant Level
MCLG:	Maximum Contaminant Level Goal
MCLG-PROP:	Proposed Maximum Contaminant Level Goal
WQC-TOX:	Water Quality Criteria - Toxic Protection - Drinking Water
WQC-RISK:	Water Quality Criteria @ 1E-06 Cancer Risk - Drinking Water
WQC-O.C.:	Water Quality Criteria - Organoleptic Criteria
DWHA:	Drinking Water Health Advisories (Lifetime)

area includes the North Landfill, the Liquid Disposal Area, and the Ash Pile.

Risks associated with soils under the trespass route are summarized in Table 9.

The evaluation of noncarcinogenic risks suggested a potential concern over soil ingestion because of lead concentrations. Comparison of estimated intakes to RfDs indicated that the estimated intakes for children based on highest detected and average lead concentrations in the northern area would exceed the RfD for lead. Estimated adult intakes of lead exceed the RfD based on the highest detected concentration.

Three surface samples (SS14 in the Liquid Disposal Area and SS19 and SS20 from the Ash Pile) contribute most significantly to this risk. If those samples are separated from the average for the north area of the site, the estimated average intake would be below any level of concern. This indicates that the Ash Pile and the Liquid Disposal Area are the areas of potential concern for direct contact.

There are no U.S. EPA soil criteria for lead or most other chemicals. The Centers for Disease Control (CDC) have said that soil lead concentrations greater than 500 to 1,000 mg/kg can cause increased blood lead levels in children in residential settings. The lead levels detected in the samples mentioned above exceed the CDC warning levels. Although the site is not a residential setting, residences are nearby and there is no restriction to access to the site.

The potential carcinogens aldrin, benzo[a]anthracene, chrysene, dieldrin, DDE, DDD, and chlordane were detected in the surface soil. Except for dieldrin, which was detected in two samples, each chemical was detected only once; therefore it is not possible to estimate an average surface soil concentration for these chemicals. Excess lifetime cancer risks from direct contact (by ingestion) with surface soils are based on the highest detected contaminant levels. Risks estimated by this approach would be conservative because of the limited distribution and generally low concentration of these chemicals. The excess cancer risk level estimates range from 3×10^{-8} (for the more frequent exposure) to 2×10^{-10} (for a one-time exposure).

Potential Current Sediment Exposures

Trespassers may come into contact with the sediments in the Eldean Tributary. The ability to estimate risks from the sediment is limited by two factors: the limited number of tributary sediment samples (3) taken adjacent to the site and the inability to positively attribute the contaminants present in the sediment to site activities.

Table 9
SUMMARY OF RISKS - DIRECT CONTACT WITH SOIL AND SEDIMENT - TRESPASS SETTING
MIAMI COUNTY INCINERATOR SITE

Area	Concentration	Target Population	Hazard Index	Chemical Exceeding RfD	Excess Lifetime Cancer Risk		Primary Chemical
CARCINOGENIC RISK							
Entire Site (a) (North and South Landfill)	Highest Detected	--	--	--	3E-08 2E-10	(b) (c)	PAHs, Dieldrin
Eldean Tributary (d) Sediments	Highest Detected	--	--	--	2E-09 3E-07	(b) (c)	PAHs, PCB
NON CARCINOGENIC RISK (e)							
North Landfill (including Liquid Disposal Area and Ash Pile)	Highest Detected	Adult	2.7	Lead	--		--
	Mean	Adult	0.63	--	--		--
	Highest Detected	Child	5.4	Lead	--		--
	Mean	Child	1.3	Lead	--		--
North Landfill (excluding Liquid Disposal Area and Ash Pile)	Highest Detected	Adult	0.16	--	--		--
	Mean	Adult	--	--	--		--
	Highest Detected	Child	0.32	--	--		--
	Mean	Child	--	--	--		--
South Landfill	Highest Detected	Adult	0.21	--	--		--
	Mean	Adult	--	--	--		--
	Highest Detected	Child	0.42	--	--		--
	Mean	Child	--	--	--		--
Eldean Tributary Sediments	Highest Detected	Child	0.006	--	--		--
		Adult	0.003	--	--		--

NOTE: See Volume II of the Remedial Investgation Report, Appendix I, Tables I-88 through I-94.

(a) Cancer risk from direct contact with soil during trespass is based on highest concentrations of carcinogens detected in soil across the entire site because of the limited number of surface soil samples containing carcinogens.

(b) Risk estimated assumed ingestion of 0.1g of soil/day. Exposure assumed to occur for 5 years, 26 weeks per year.

(c) Risk estimated assumed ingestion of 0.1g of soil/day. Exposure assumed to occur once.

(d) Cancer risk from direct contact with sediment during trespass is based on highest concentrations of carcinogens detected in sediment because of the limited number of carcinogens detected in sediment. This estimate assumes chemicals are due to site activities.

(e) Noncarcinogenic risks estimated by comparing estimated daily intake to reference dose (RfD) value. Adult exposure assumed a body weight of 70-kg and a soill ingestion rate of 0.1g/day. Child exposure assumed a body weight of 35-kg (10-year old) and a soil ingestion rate of 0.1g/day.

The evaluation of noncarcinogenic risks indicate that under the defined exposure conditions the hazard index would not exceed one. The excess lifetime cancer risk estimate ranges from 2×10^{-9} for one-time exposure to 3×10^{-7} (for more frequent exposure).

Future Soil Exposures

Soil exposures might occur if the site is developed, if the site is unused but left open for trespass, or if the site is used as a park. Residential site use could produce the greatest exposures. Development of the site could result in the excavation of soil for building foundation and utility lines. Contaminated subsurface material could be left on the site surface when future residents could come into contact with it. The contaminant concentrations to which future residents may be exposed to would depend on what portions of the site are excavated, the depth of excavation, and the ultimate deposition of the material. These concentrations cannot be predicted precisely, especially since the RI soil sampling efforts were focused on potential source areas (i.e., liquid disposal area and ash pit).

The evaluation of noncarcinogenic risk suggest a potential risk from soil ingestion under residential development due primarily to lead.

The excess lifetime cancer risks range from 2×10^{-3} (based on the highest detected concentrations) to 3×10^{-5}. (based on the geometric mean concentrations). The primary chemicals contributing to the risk estimates are dioxins, arsenic, hexachlorobenzene, PAHs, and PCBs.

Future development soil risks are summarized in Table 10.

VII. DISCUSSION OF CHANGES FROM PROPOSED PLAN

CERCLA Section 117(b) requires that the final selected remedial action plan be accompanied by a discussion of any significant changes from the proposed plan and of the reason for such changes. U.S. EPA has received additional information since the publication of the Proposed Plan, which it has reviewed and analyzed together with information which was already in its possession.

Such new information and data received by the Agency in response to the publication of the proposed plan indicate the following:

A submittal was made by the Business and Industry Environmental Committee (BIEC) dated April 26, 1989 as part of the Public Comment period. This document indicated the availability of the Troy POTW to treat the contaminated groundwater from the site. This will allow the discharge of the contaminated water to a sewer line which is located near the site with pretreatment; if required to meet applicable standards. The availability of this treatment method also affects the configuration of the groundwater pumping for the liquid disposal area

-14-a

Table 10
FUTURE DEVELOPMENT - SOIL RISK SUMMARY
MIAMI COUNTY INCINERATOR SITE

Concentration	Target Population	Hazard Index	Chemical Exceeding RfD	Excess Lifetime Cancer Risk	Primary Chemical
Highest Detected	Residents (a)	--	--	2E-03	Dioxins, Arsenic, Hexachlorobenzene, PCB, PAHs
	Adult (b)	8.2	Chromium (+6) Lead	--	--
	Child (c)	38	Chromium (+6) Lead Antimony	--	--
Arithmetic Mean	Residents	--	--	1E-04	PAHs, Dioxins
	Adult	0.65	--	--	--
	Child	3	Lead	--	--
Geometric Mean	Residents	--	--	3E-05	PAHs, Dioxins
	Adult	0.1	--	--	--
	Child	0.49	--	--	--

NOTE: See Volume II of the Remedial Investigation Report, Appendix I, Tables I-95 through I-103.

(a) Carcinogenic risk estimates assume ingestion of 0.1g soil/day for 70 years. Body weight of 70-kg is assumed.

(b) Adult noncarcinogenic risk estimated by comparing estimated daily intake to to reference dose (RfD) value. Assumes a soil ingestion rate of 0.1g soil/day and a 70-kg body weight.

(c) Child noncarcinogenic risk estimated by comparing estimated daily intake to reference dose (RfD) value. Assumes a soil ingestion rate of 0.1g soil/day and a 15-kg (toddler) body weight.

since the cost of treating the groundwater has been greatly reduced. Thus, more groundwater can be treated at a lower cost and little dewatering prior to vapor extraction need occur.

In response to the BIEC comments and other comments, U.S. EPA reconsidered and analyzed some of the information already in its possession. Specifically, it revisited the "applicable or relevant and appropriate" issue of the cap for the North Landfill including the Liquid Disposal Area based on (40 CFR Part 265). While as much as 30 percent of the waste placed in the North Landfill was industrial, the amount of hazardous substances placed in this area is estimated to be only a small percentage of the total waste. Therefore, capping this area in accordance with the State sanitary landfill closure regulations is deemed relevant and appropriate.

The Liquid Disposal area had a substantial amount of hazardous substances including some hazardous wastes placed in it and therefore, will be closed according to RCRA subtitle C. It will be closed with a double barrier cap which will meet provisions on 40 CFR part 265.310 and the U.S. EPA minimum technology guidance for hazardous waste landfills.

The BIEC public comment submittal and subsequent submittals proposed capping the Ash Disposal pit in place and covering the cap with an asphalt parking lot. The proposed cap would meet State closure requirements and be equally protective of human health and the environment for this type of a waste area and is thus considered on equivalent alternative to the selected remedy.

In general, the additional information based on use of the Troy POTW, the ability of the single barrier cap to comply with State sanitary landfill closure requirements for the North Landfill, and the ability of the double barrier cap to comply with 40 CFR 265 and minimum technology guidance for the Liquid Disposal area, all support a modification of the proposed remedy.

VIII. DESCRIPTION OF ALTERNATIVES

REQUIREMENTS COMMON TO ALL REMEDIAL ACTIONS

Response actions that will be required for some or all of the operable units include flood control, access restrictions, and groundwater monitoring.

FLOOD CONTROL

Part of the incinerator site lies within the 100-year flood plain. The 100-year flood is a flood that has a 1 percent change of being equalled or exceeded in any given year. The proposed flood protection measure associated with containment alternatives is to grade the final cover or cap to a maximum slope of one vertical to three horizontal, install erosion matting along potential flood areas, and establish dense vegetation on the cover or cap. Earth berms and rip-rap would result in greater modifications to the floodway, so they were not considered. Minimum alteration of the floodway could be achieved by balancing the materials removed or placed below the 100-year flood elevation.

ACCESS RESTRICTIONS

Access restrictions include regulation of site land use by zoning, by restrictive covenants in the deed, and by fencing the site. A 6-foot-high chain link fence with warning signs to trespassers would be placed around the North and South Landfills including the Liquid Disposal Area. Fencing would also enclose any treatment or storage facilities constructed onsite.

Future land use at the site would be restricted under all remedial alternatives. Restrictions would prevent onsite development or other activities that might compromise protective measures or interfere with long-term site monitoring.

The purpose of deed notifications is to record a note on a deed or some other instrument examined during a title search that would notify any potential purchaser that the land had been used for waste disposal and that land use is restricted. Deed restrictions would prevent disturbance of the final cover or cap and control future property use.

Offsite groundwater withdrawal restrictions would be necessary to prevent any adverse impact to the proposed extraction well system. Groundwater users located within the pathway of groundwater contaminant migration would continue to be offered access to the City of Troy's public water supply and existing wells would be properly abandoned.

GROUNDWATER MONITORING

Groundwater monitoring will be performed to evaluate the effectiveness of remedial actions. Monitoring will focus on the effectiveness of actions designed to control contaminant release from the Liquid Disposal Area and to control the existing groundwater contaminant plume. Monitoring will also include evaluation of the long-term effectiveness of remedial actions taken at the North and South Landfills, and the Ash Pile and the Ash Disposal Pit. The ground water monitoring program is discussed below.

In addition to the monitoring network that is in place, additional groundwater monitoring will be required. At a minimum, this will include monitoring locations as presented in Figure 3.

South Landfill. A monitoring well cluster (one monitoring well in the upper aquifer, and one monitoring well in the lower aquifer will be installed on the south edge of the south landfill, see Figure 3). An additional monitoring well will be installed in the upper aquifer at the location CH-06. A monitoring well will also be installed in the lower aquifer at location CH-07.

Contaminant Plume. Three monitoring well clusters (one monitoring well in the upper aquifer, and one monitoring well in the lower aquifer) will be installed along the northern bank of the Eldean Tributary to monitor the southern component of contaminant movement. A fourth monitoring well cluster will be located at the corner of Lytle Road, and County Road 25-A.

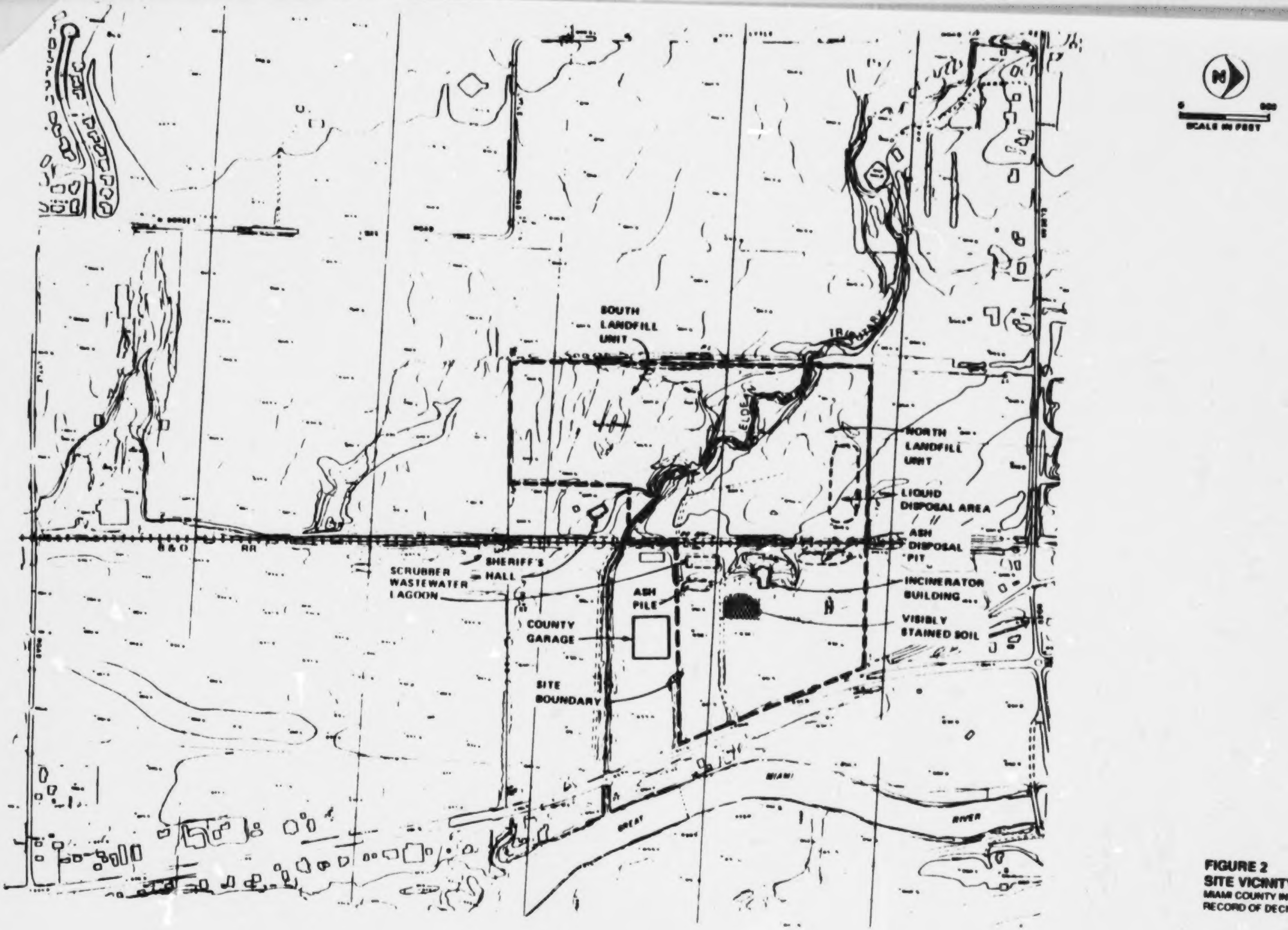
Groundwater Quality. All monitoring wells including upgradient wells and those hydraulically downgradient from both the north and south landfills and Liquid Disposal Area, and completed in either the upper or lower aquifers will be sampled immediately before and after start-up of the extraction system, on a quarterly basis at least for the first year and on a semi-annual basis at a minimum thereafter. Groundwater samples will be analyzed quarterly for the full CLP list of compounds for the first year, at which time a site-specific parameter list will be developed. Subsequently, groundwater samples will be analyzed for the site-specific parameter list. At the end of the second year, and every two years thereafter, selected monitoring wells (to be determined later) within the network will again be sampled and analyzed for the full CLP list.

SOUTH LANDFILL OPERABLE UNIT

The surface area of South Landfill is approximately 17 acres and would require clearing, grubbing, regrading, filling, and compaction before installation of a soil cover or cap. Three-parallel mounds from landfill trench and fill operations run from east to west and occupy approximately one-half the landfill. The slopes of the mounds range from 6 to 23 percent. The remaining half of the landfill area is relatively flat with slopes averaging less than 1 percent. Minimum final slopes of 3 percent were assumed for the cover and cap alternatives. Because this is a sanitary landfill, allowances in design, construction, and maintenance must be made for differential landfill settlement to maintain required final slopes.

The South Landfill was in operation for approximately 10 years and reportedly accepted general municipal refuse. As a result, the landfill may generate methane gas in sufficient quantities to cause the migration and accumulation of gases in explosive concentrations if not property vented. Therefore, installation of landfill gas vents for any of the containment alternatives will be evaluated during predesign or design. In any case, a plan for monitoring explosive gases to satisfy the requirements of OAC 3745-27-12 will be implemented.

(7)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SCALE IN FEET
SOUTH LANDFILL UNIT
NORTH LANDFILL UNIT
LIQUID DISPOSAL AREA
ASH DISPOSAL PIT
INCINERATOR BUILDING
VISIBLY STAINED SOIL
SHERIFF'S HALL
SCRUBBER WASTEWATER LAGOON
ASH PILE
COUNTY GARAGE
SITE BOUNDARY
B & O RR
TRIBUTARY
GREAT MIAMI RIVER

FIGURE 2
SITE VICINITY MAP
MIAMI COUNTY INCINERATOR
RECORD OF DECISION

Reproduced from best available copy.

The 100-year flood plain extends along the Eldean Tributary and may approach the northern boundary of the South Landfill. Slopes along that boundary would be stabilized with soil stabilization matting as necessary.

Alternative A1—No Action

The South Landfill would remain as it is under the no action alternative.

Alternative A2—Compacted Soil Cover

Under Alternative A2, the landfill would be cleared, graded, and covered with 2 feet of common fill. Six inches of topsoil would be placed on the fill to support grassy vegetation. Gas vents would be installed throughout the landfill, if necessary. Erosion control matting would be placed along the embankment of the Eldean Tributary. The soil cover would reduce exposure to surface contaminants, control surface water runoff, minimize erosion, and reduce (but not prevent) groundwater infiltration.

Cover maintenance would consist of regular mowing, inspection for signs of erosion, settling and burrowing by animals, and performing necessary repairs. Periodic replacement of topsoil and reseeding is expected.

Alternative A3—Single Barrier Cap

The single-barrier cap system would require 2 feet of clay compacted to a maximum permeability of 1×10^{-7} cm/s. This low permeability complies with a performance standard for closure of sanitary landfills in accordance with the Ohio Administrative Code as interpreted by Ohio EPA policy. Sufficient soil and topsoil will be placed over the cap to provide frost protection and promote vegetation. A drainage layer will be evaluated during design. The minimum final slope will be 3 percent. Topsoil, vegetation, active or passive gas vents, erosion control matting, and maintenance would be similar to those for Alternative A2.

Either containment alternative would require construction of a decontamination pad and installation of temporary office facilities at the site.

NORTH LANDFILL OPERABLE UNIT

Three containment alternatives were developed for the North Landfill: a compacted soil cover, a single-barrier cap, and a double-barrier cap. No treatment technologies were retained from technology screening because of the danger to workers, the nuisance to the community, and the prohibitively high costs associated with treating such large quantities of waste.

The North Landfill, excluding the Liquid Disposal Area, is about 17 acres and would require clearing, grubbing, regrading, filling, and compaction before installation of a soil cover or cap. It is relatively flat from north to south through the middle of the landfill. From east to west, slopes range from less than 1 percent to 8 percent, but they are generally 2 to 3 percent. Minimum final slopes of 3 percent are selected for all containment alternatives.

The general components of the containment alternatives with regard to the 100-year flood plain protection, landfill gas venting, explosive gas monitoring, and decontamination facilities would be the same as those for the South Landfill.

Alternative B1—No Action

The North Landfill would remain as it is under the no-action alternative.

Alternative B2—Compacted Soil Cover

The compacted soil cover would be similar to that discussed for the South Landfill. Two feet to fill, 6 inches of topsoil, active or passive gas vents, and soil stabilization matting along the tributary embankment would be installed. A dense vegetative cover would be also established.

Alternative B3—Single-Barrier Cap

The single-barrier cap would be similar to that for the South Landfill. Passive or active gas vents, if necessary, and soil stabilization matting along the tributary embankment would be installed. A dense vegetative cover would be established.

Alternative B4—Double-Barrier Cap

The double-barrier cap system would consist of 6 inches of topsoil over 1 foot of fill; 18 inches of sand and perforated drain pipe as a drainage layer; a geotextile filter between the cover fill and sand; a 40-mil high density polyethylene (HDPE) synthetic liner; and 2 feet of clay compacted to a maximum permeability of 1×10^{-7} cm/s. Active or passive gas vents would be installed through the capping system. Maintenance would be similar to that for the single-barrier cap.

ASH DISPOSAL PIT AND ASH PILE

The general response actions for both the Ash Disposal Pit and the Ash Pile are containment, removal, treatment, and disposal. Removal and consolidation of wastes was considered both with and without stabilization/fixation treatment. Stabilization/fixation may be necessary for compliance with proposed RCRA land disposal restrictions that may be in effect at the time of action. Stabilization/fixation will be necessary if the ash fails the EPTox test and is thus a RCRA hazardous waste by characteristic and will be placed in a non RCRA facility such as the North or South Landfill including the Liquid Disposal Area. Samples taken from the Ash Disposal Pit and the Ash Pile will be analyzed for appropriate waste characteristics for consolidation alternatives with or without treatment.

Alternative C1—No Action

The Ash Disposal Pit and Ash Pile would remain as they are under the no-action alternative.

Alternative C2—Single-Barrier Cap

Single-barrier caps for the Ash Disposal Pit and Ash Pile would consist of 2 feet of clay compacted to a maximum permeability of 10^{-7} cm/s and sufficient fill and topsoil to provide frost protection and promote vegetation. Additional fill may be required for the Ash Disposal Pit to provide a minimum 3 percent slope. The Ash Pile is believed to exhibit sufficient load-bearing strength to support the weight of the proposed cap. Existing slopes may be too steep for a cap without minor regrading. Should the ash fail the EPToxic test, it would be considered a RCRA hazardous waste and a double barrier cap would be required. This cap is described under the North Landfill section.

The Ash Disposal Pit does not appear to lie within the 100-year flood plain, so no flood protection was assumed. Because the Ash Pile lies entirely within the 100-year flood plain, the vegetative cover would be stabilized with erosion control matting to minimize the potential for washout. Erosion control matting would be installed over the entire cap before seeding to stabilize vegetation. A drainage system of earthen berms and swales may be required to prevent site drainage from running across the cap.

The BIEC has proposed capping the Ash Disposal Pit in place. The cap would be covered by a drainage layer and paved with asphalt and utilized as a transfer station parking lot. The cap will consist of 2 feet of clay compacted to a maximum permeability of 10^{-7} cm/s overlain by 14 inches of granular material overlain by four inches of asphaltic concrete. The asphaltic concrete will have a permeability of 10^{-7} cm/s and will be maintained in such a manner that this permeability is continued. Sufficient additional granular material or fill to a minimum depth of 2 feet over the cap must be utilized for frost protection. The ash must be tested for EP Toxicity and if it fails, a double barrier cap, as described in the North Landfill section, must be utilized. Provisions must be made to provide for testing in and below the cap to determine its effectiveness in reducing infiltration into the waste on an annual basis at a minimum. Deed notification/property use restrictions to prohibit use of groundwater and excavation of the ash will be required. This alternative is considered equally protective to alternatives C3 or C4 which have been selected by U.S. EPA depending on results of EPToxic testing.

Alternative C3—Consolidation without Treatment

Alternative C3 involves excavation, loading, and hauling of wastes directly from the Ash Disposal Pit and the Ash Pile to the North or South Landfill. Consolidated wastes would be used to grade the North or South Landfill surface to slopes required for a cover or cap. Waste staging would not be required. Daily cover and erosion protection of wastes would prevent the migration of wastes and contaminated runoff. Appropriate measures will be taken to prevent dust generation.

Approximately 22,000 cubic yards of waste and soil would be removed, assuming excavation depths of 12 feet for the Ash Disposal Pit and 2 feet for the Ash Pile. At a productivity rate of 320 cubic yards per day for excavation, it would take about 3 months to consolidate the wastes. Closure of the Ash Disposal Pit and Ash Pile would require 20,000 cubic yards of common backfill and 1,000 cubic yards of topsoil to establish a vegetative cover.

Alternative C4—Consolidation with Treatment

Alternative C4 assumes that waste stabilization/fixation would be performed before consolidation. Waste mixing could be accomplished in the Ash Disposal Pit and Ash Pile with earthmoving equipment (e.g., backhoes) or in batches with pugmills. In-place treatment would progress from one end of the pit to the other end. Better mixing would be achieved through the use of pugmills rather than in-place mixing, so batch mixing was assumed to be the most representative approach.

The stabilization/fixation treatment would require the addition of lime and water to the ash to produce a material resembling a cohesive soil. Quantities of specific additives would be determined during treatability studies before or during remedial design. Waste sampling and analysis must be performed to verify and document sufficient treatment to comply with land disposal restrictions. The stabilization/fixation process was assumed to increase the volume of material to be disposed of by approximately 30 percent. Stabilized material would be placed in the North or South Landfill. Appropriate dust control measures would be utilized.

LIQUID DISPOSAL AREA AND GROUNDWATER

Alternatives for the Liquid Disposal Area and groundwater were developed by identifying independent alternatives for the Liquid Disposal Area and for the groundwater, identifying possible combinations of alternatives for the operable unit, and screening to reduce the number of alternatives to a reasonable range for detailed evaluation.

Alternative D1—No Action

The Liquid Disposal Area and groundwater would remain as they are under the no-action alternative.

Alternative D2—Cap with Natural Groundwater Attenuation

Alternative D2 consists of constructing a double-barrier cap over the Liquid Disposal Area to minimize the infiltration of precipitation through wastes and subsequent leachate generation. Contaminant migration would be assessed through a regular groundwater monitoring program.

Double-Barrier Cap. The double-barrier cap would consist of 6 inches of topsoil over 1 foot of fill; 18 inches of sand and perforated drain pipe as a drainage layer; a geotextile filter between the fill and sand; a 40 mil HDPE synthetic liner over 2 feet of clay compacted to a maximum permeability of 1×10^{-7} cm/s or its equivalent. Active or passive gas vents as appropriate would be installed through the capping system. Maintenance of the cap would consist of regular mowing, inspection for signs of erosion, settling and burrowing by animals, and performing necessary repairs.

Natural Groundwater Attenuation. Natural attenuation is the tendency of contaminant concentrations to decrease through physical, chemical, and biological processes. Thus, the natural attenuation alternatives do not involve groundwater collection or treatment, but do include monitoring, institutional control, and possibly an alternative water supply for nearby residents.

Natural attenuation satisfies the remedial objectives only by establishing alternative concentration limits for groundwater contaminants and verifying installation of an alternative water supply for private water supply wells that could become contaminated. Groundwater monitoring is required to track movement of the contaminant plume.

Contaminant concentrations obtained from monitoring wells located near the Great Miami River were used to estimate contaminant loadings to the river and resulting instream concentrations. Expected river concentrations of 1,1-dichloroethane, 1,2-dichloroethene, and vinyl chloride are estimated to be 0.13 ug/l, 1.86 ug/l, and 0.46 ug/l respectively for the lowest 7-day flow occurring every 10 years ($7Q_{10}$). The $7Q_{10}$ flow is 27 cfs and the estimated groundwater discharge is 0.1 cfs. Concentrations in the river of 1,1-dichloroethane, 1,2-dichloroethene, and vinyl chloride are estimated to be 0.003 ug/l, 0.046 ug/l, and 0.011 ug/l respectively for the average groundwater discharge into the annual average low flow for the Great Miami River.

An analytical program was used to estimate contaminant migration after placement of the cap. Contaminant losses due to volatilization and biodegradation were not estimated due to the difficulty in establishing loss rates. The contaminant migration calculations showed that the vinyl chloride concentrations near the river would increase over the next 25 years. The concentrations of vinyl chloride would begin to decrease until a uniform concentration was achieved (approximately 20 to 50 ug/l) after about 80 years. This time period represents the movement of approximately 4 pore volumes of water through the contaminant plume area. Based on a $7Q_{10}$ flow of 27 cfs, concentrations of 1,1-dichloroethane, 1,2-dichloroethene, and vinyl chloride were calculated at 0.77 ug/l, 2.27 ug/l, and 1.09 ug/l, respectively, during the highest contaminant discharge to the river occurring in about 25 years. Similarly, contaminant dilution using 1986 average flow of 1,088 cfs resulted in contaminant concentrations of 0.019 ug/l of 1,1-dichloroethane, 0.056 ug/l of 1,2-dichloroethene, and 0.027 ug/l of vinyl chloride.

Alternative D3—Double-Barrier Cap with Groundwater Treatment

The major components of Alterative D3 include a double-barrier cap over the Liquid Disposal Area, a groundwater collection and treatment system that would intercept the contaminant plume and prevent migration to the Great Miami River, or toward offsite receptors and to restore aquifer quality. An air stripping tower to treat the combined flow prior to surface water discharge is also included.

Double-Barrier Cap. The double-barrier cap would be the same as that described for Alternative D2.

Groundwater Collection. Because of the high variability in both the geologic and hydrologic characteristics of the site, a groundwater model was developed to aid in the analysis of groundwater extraction alternatives. The model was calibrated to potentiometric data obtained in September 1987 and verified using data obtained in March 1988. A full description of how the model was constructed, its sensitivity, and its calibration/verification is presented in Appendix G of the RI report.

To analyze the groundwater extraction alternatives, each alternative was designed for the low water table condition observed in September 1987, then tested using the model under the high water table condition observed in March 1988 to evaluate whether the influence of the proposed pumping scheme resulted in changes to the basic conditions assumed in the model. All drawdowns shown graphically in connection with the modeled alternatives are in reference to the September 1987 data.

The groundwater extraction system, referred to as the "representative groundwater collection system," includes several extraction wells placed near the Liquid Disposal Area for source control and downgradient extraction wells to intercept contaminants migrating toward the Great Miami River or toward offsite receptors. In developing the representative collection system, drawdown within the aquifer was minimized so that a large portion of the aquifer remains saturated to maximize the efficiency of the extraction system. This reduces the possibility of leaving contaminants absorbed to the aquifer matrix after pumping has been shut down.

The representative groundwater collection system includes four upper aquifer contaminant migration extraction wells near the Liquid Disposal Area, five upper aquifer and five lower aquifer onsite downgradient wells, and two upper aquifer and two lower aquifer offsite downgradient wells. This extraction well configuration was selected because it would provide an inward gradient within the plume boundary and minimize drawdown. Based on this configuration, the estimated flow for the system is 80 gpm. This estimate is based on the limited data available from the RI. The flow rate may increase depending upon conditions actually encountered as the extraction system is installed and brought on line.

The estimated time to remediate the aquifer is based on the removal of four pore volumes. The four extraction wells near the Liquid Disposal Area and screened in the upper aquifer are expected to operate for more than 30 years. The onsite downgradient wells screened in the upper and lower aquifer would pump for about 15 and 8 years, respectively. The offsite downgradient wells would operate for about 5 years. These cleanup period estimates are provided for comparative purposes. Actual time to achieve MCLs or other health-based or risk based levels may be longer.

Black, oily, stained soil in the upper 2 to 10 feet of the saturated zone was observed at some locations in the Liquid Disposal Area. Extraction of organic contaminants in the area could be accelerated if surfactants were injected into the groundwater. The surfactants reduce surface tension properties of less soluble compounds, thus increasing their mobility. This option is not included in Alternative D3 but should be considered further in predesign.

Groundwater Treatment. The groundwater treatment system was developed on the basis of existing site data and conditions. Several assumptions were made to present details concerning the process sequence, equipment size, groundwater flows, and extracted groundwater concentrations. Pilot-testing may be required during design to verify the accuracy of these assumptions or identify changed conditions.

The combined flow from the representative groundwater collection system would be treated using an air stripping tower. Preliminary sizing requirements were based on likely surface water discharge limits. A 95 percent removal efficiency for total VOCs is expected using one stripping tower about 4 feet in diameter with a 20-foot packing depth. The overall height of the tower would be 30 feet, but could vary depending on the height of the emissions control or exhaust stack and the VOC removal efficiency desired.

The extracted groundwater would be pumped directly to the tower without pretreatment. An equalization tank with a 4-hour holding time would be used to detain groundwater during periodic rinsing of the tower packing with a mild acid solution. Precipitation, sedimentation, and filtration could be necessary because packed towers are subject to fouling biological growth and precipitation of metals.

If surfactants are used to improve removal of contaminants from beneath the Liquid Disposal Area, additional treatment processes will probably be required to treat the surfactants and the increased contaminant concentrations.

Alternative D4—Vapor Extraction and Cap with Groundwater Treatment

Alternative D4 would consists of soil vapor extraction and vapor phase carbon treatment, groundwater pumping and onsite air stripping, and closure of the Liquid Disposal Area with a double-barrier cap.

Evaluation of the soil samples obtained from the 18 test pits suggests that the Liquid Disposal Area may extend east and south of the area investigated. The liquid disposal area will be further defined by soil gas testing or other appropriate methods before implementation of the remedy.

On the basis of the RI results and the cost sensitivity analysis, the area for soil vapor extraction was identified as the Liquid Disposal Area (100,000 square feet). The VOC contaminant mass was estimated at 33,000 pounds based on an estimated average concentration of 120,000 ug/kg total VOC over the 2.3-acre area to a depth of 25 feet (92,000 cubic yd). The average concentration of total VOCs obtained from the Liquid Disposal Area investigation is about 240,000 ug/kg. However, 120,000 ug/kg was assumed to be more representative of the entire area because the observed average of total VOCs may have been biased high by nonrandom sample collection and very high levels of total VOCs detected in a limited number of samples.

Vapor Extraction System. Pilot testing would be required to optimize the design for the vapor extraction and vapor phase carbon treatment units. The pilot test would determine:

- The effective radius of influence of the vacuum extraction system along with the vapor flow rate and vacuum/pressure relationship at each well.
- The vacuum/pressure distribution in the vadose zone, particularly in waste zones, during vacuum extraction.
- The VOC loading rate from individual wells, as a function of vacuum/pressure and flow rate.

The effective radius of influence is assumed to be 30 feet. Control of oxygen levels within the fill is important because oxygen within refuse increases aerobic microbial activity with resulting increased landfill temperatures and potential for landfill fires. Based on a conservative radius of influence of 30 feet, 36 vacuum wells would be required for the 2.3-acre area.

The system would consist of a network of 4-inch PVC extraction wells and 2-inch inlet wells with slotted screens from approximately 5 feet below grade to the upper till unit. The wells would be packed with gravel or sand in the screened zone and sealed with bentonite and grout. The entire area proposed for vapor extraction would be sealed at the surface by a temporary 1-foot clay cap. The temporary cap and inlet wells would control air flow radially through contaminated soil.

The extraction wells would be connected by a header system. To monitor and control system performance, each vapor extraction well would contain a valve, sample port, and vacuum/ pressure gauge. The header system would be connected to a vapor phase treatment system. The outlet of the vapor phase treatment system would be piped to a blower that induces the airflow through the subsurface to the extraction wells. Placement of the vapor phase treatment system on the negative pressure side of the blower was assumed because VOCs would not leak out under vacuum.

The time necessary to achieve effective VOC reduction by vapor extraction is affected by many variables. It is assumed that the vapor extraction system would operate long enough to reduce the total mass of soil VOCs in soil by 90 percent or more. This will be measured by determining that at least a 90 percent reduction of indicator VOCs was achieved over levels found during pilot testing. Should this not prove practical, the levels will be graphed and VOC extraction will continue until a leveling of the curve occurs and removal is no longer found to be cost effective by U.S. EPA. If the curve does not level off until greater than 90 percent removal occurs, extraction will continue until the curve does level off.

During pilot testing and design the appropriateness and size of the Vapor Extraction system will be evaluated. If such a system is not found to be effective another treatment method such as incineration or active soil flushing will be evaluated and implemented. Active soil flushing will involve adding water to the Liquid Disposal Area to percolate through the soil column.

Vapor Phase Treatment. The vapor phase treatment system would consist of a vapor/water separator, a preheater, and carbon adsorption system. The separator and preheater would remove moisture and dissolved organics from the vapor stream and lower the relative humidity of vapor to improve carbon treatment efficiency. The expected relative humidity of near 100 percent would be reduced to 40 to 50 percent for optimal carbon usage. The carbon adsorption system would consist of two stainless steel carbon canisters connected in series. The second canister would serve as a backup unit in the event of VOC breakthrough in the primary canister. The canisters would each hold 2,000 pounds of granular activated carbon. A sampling port, vacuum/ pressure gauge, and temperature gauge would be installed upstream and downstream of each carbon unit. A carbon monoxide meter would be installed after each carbon unit to detect whether combustion is occurring in the carbon units.

The exhaust discharge from vapor phase treatment was assumed to comply with air permit discharge requirements established during design of the vapor phase treatment.

The vapor phase treatment system will be evaluated during design and the most appropriate system implemented which will meet relevant standards.

Capping. A temporary clay cap would be installed before operation of the vapor extraction system began. The temporary cap would limit the vertical movement of air from the ground surface to the extraction wells so that radial airflow would maximize the migration of air through contaminated wells. After vapor extraction operation is completed, a final double-barrier cap would be installed to close the Liquid Disposal Area. It is assumed that the earth materials for the temporary cap would be used in the construction of the final cap after completion of soil vapor extraction. If gas venting is required, the vapor extraction or inlet wells may be converted to landfill gas vents.

Construction of the temporary cap would require grading the surface of the Liquid Disposal Area in a manner consistent with final cap design. A 1-foot barrier of compacted clay would be installed and covered by 1 foot of cover soil, and then be vegetated to protect the clay and prevent erosion.

Groundwater Collection. Modifications to the representative collection system were necessary for Alternative D4 to improve vapor extraction performance. Groundwater pumping modifications include adding six aquifer dewatering wells in the Liquid Disposal Area and eliminating the four extraction wells near the Liquid Disposal Area during vapor extraction. The total flow for the system is expected to increase from 80 gpm to about 100 gpm. The vapor extraction system is expected to operate for about 2 years. After vapor extraction is completed, dewatering of the Liquid Disposal Area will no longer be necessary. After vapor extraction, some of the aquifer dewatering wells may be abandoned and the remaining extraction wells on the east side of the Liquid Disposal Area will serve as blocking wells similar to the representative groundwater collection system.

Groundwater Treatment. The air striping treatment system discussed above would also be implemented for this alternative. The groundwater collected during the initial dewatering of the Liquid Disposal Area may not be amendable to air stripping because its composition could be more characteristic of landfill leachate as a result of decomposing municipal refuse buried there. As a contingency, an alternate treatment method will be utilized which meets all regulatory requirements if groundwater from the Liquid Disposal Area is not ameanable to Air Stripping. For instance, concentrations of BOD_5 and COD and possibly of inorganic constituents could be higher than those observed in groundwater samples. The quality of the groundwater extracted during the initial dewatering is difficult to predict accurately because many variables can affect leachate generation, such as the composition of the waste, the percolation of rainwater, and the dilution with groundwater.

Alternative D4A—Modified Vapor Extraction and Cap with Groundwater Treatment

Alternative D4A was developed after consideration of public comments on the RI report, FS report, and Proposed Plan. Alternative D4A is similar to D4 although each of its major components has some modifications. It includes soil vapor extraction in the Liquid Disposal Area and treatment of the resulting air emissions, groundwater pumping and treatment at the City of Troy publicly owned wastewater treatment plant (POTW), and closure of the Liquid Disposal Area with a double-barrier cap.

Vapor Extraction System. The vapor extraction system would be installed in the same area as under Alternative D4. The system would be designed to remove volatile organic compounds (VOCs) from the unsaturated zone. Dewatering wells would not be used to increase the depth of VOC removal as in Alternative D4. VOCs present below the water table would be removed as they migrate to the groundwater extraction wells at the downgradient boundary of the Liquid Disposal Area.

The components of the vapor extraction system would be as described for Alternative D4 with the exception that air inlet wells and a temporary clay cap would not be used. Air would be allowed to infiltrate from the surface downward to the air extraction wells. This would reduce the potential for increased microbial activity near air inlet wells that could result in unacceptable temperature increases and possible fires. It also eliminates the cost of a temporary clay cap. Short circuiting of air from the surface downward along the outside of the air extraction well casing would be controlled by carefully sealing the borehole during construction. Pilot testing and VOC reduction would be the same as that described for Alternative D4.

A vapor phase treatment of the emissions system may be required. The need for and type of treatment would be determined in the design. For costing purposes, activated carbon adsorption was included, as described for Alternative D4.

Capping. Following soil vapor extraction the Liquid Disposal Area would be capped with the double-barrier cap consistent with the requirements of RCRA Subtitle C. The cap was assumed to consist of 2 feet of clay compacted to a maximum permeability of 1×10^{-7} cm/s, a 40-mil high density polyethylene (HDPE) synthetic liner, 1 1/2 foot of sand drainage layer, a filter fabric, 1 foot fill, and 6 inches of topsoil. If methane gas venting is necessary, the vapor extraction wells may be converted to landfill gas vents.

Groundwater Collection. The groundwater collection system would be identical to the representative collection system described for Alternative D3. As mentioned in the discussion of vapor extraction, dewatering wells are not part of this alternative.

Evaluation of the most efficient method of vapor extraction will be considered in the design. It is possible that results of design analysis may include provisions for partial dewatering to maximize the cost-effectiveness of VOC removal.

Groundwater Treatment. Extracted groundwater would be treated offsite at the City of Troy POTW. The groundwater would be discharged to the sanitary sewer force main being designed parallel to County Highway 25 A.

Discharge to the POTW may require pretreatment to comply with the discharge requirements or to meet U.S. EPA and OEPA requirements for effective treatment. Provisions of the sewer use ordinance that may be applicable to the site restrict the discharge of:

- Any slug load of pollutants, including BOD_5, that would interfere with the POTW operation or cause the City to violate its NPDES permit
- Any toxic pollutant in sufficient quantity to interfere with the treatment process or pose a hazard to operators
- Metal-contaminated wastewater for a 24-hour composite sample that exceeds the following daily maximum discharge concentrations:

Arsenic	0.37 mg/l
Cadmium	0.69 mg/l
Chromium	5.0 mg/l
Copper	3.0 mg/l
Cyanide	0.88 mg/l
Iron	30.0 mg/l
Lead	0.68 mg/l
Mercury	0.0037 mg/l
Nickel	5.0 mg/l
Zinc	2.0 mg/l

For cost estimating purposes, it was assumed that pretreatment of groundwater will not be necessary before discharge to the POTW.

Alternative D5--Incineration with Groundwater Treatment

Alternative D5 would consist of excavating the contaminated wastes and soil from the Liquid Disposal Area and incinerating them at the site using a portable rotary kiln incinerator. The residual ash would be placed back in the Liquid Disposal Area and a cap would be placed over the area once treatment was complete. The groundwater extraction and treatment system for this alternative is similar to that for Alternative D3 except shorter operating times are expected, particularly for the extraction wells near the Liquid Disposal Area, because of the source control measures.

Excavation Quantities. The area requiring excavation is defined on the basis of RI field observations and analytical results, hazards identified in the endangerment assessment, historical information, and sensitivity analysis. The volume of soils of the area to be treated will be further evaluated before or during waste removal and soil excavation

The U.S. EPA does not have standards for the cleanup of contaminated soil or refuse. Target concentrations were estimated in the endangerment assessment for both carcinogenic and noncarcinogenic health risks from exposure by direct contact with contaminants as a result of site development. Samples collected from 14 of the 18 test pit locations exhibited contaminant concentrations that exceeded target levels. The four test pit locations with sample concentrations below the target levels are located near the northern and western boundaries of Liquid Disposal Area investigated.

Because of the uncertainty associated with identifying the areal extent of the Liquid Disposal Area, a sensitivity analysis was performed on the volume to be removed. The volume estimates used to evaluate the sensitivity of the incineration costs were based on the following areas for excavation:

- Area 1 is approximately 100,000 square feet and includes the Liquid Disposal Area investigated in the RI and characterized by the test pit sampling data. The volume for removal is about 81,500 cubic yards.

- Area 2 is about 50,000 square feet. The areal estimate reflects the possibility of partial excavation, but assumes that there is insufficient information to identify specific areas for partial excavation at this time. The volume for removal is about 40,700 cubic yards.

- Area 3 is about 150,000 square feet. This estimate assumes, on the basis of historical information, that the boundary of the Liquid Disposal Area is beyond the outer limit of the area investigated in the RI. The volume for removal is approximately 122,200 cubic yards.

In all three volume estimates, the excavation depth extends into the saturated soil, about 2 feet below the water table. According to soil boring results, the water table is about 20 feet below grade.

In addition to conventional construction equipment, excavation may require specialized machinery for the removal of drums and bulky pieces of refuse. Extensive safety procedures and monitoring would be required for protection of workers. Control of fugitive dust and vapors may be of concern. Workers would wear level B protective gear for much of the subsurface excavation. A vapor suppressing foam or water spray may need to be applied to control dust or vapors.

The following assumptions have been made regarding the proportions of wastes to be excavated from the Liquid Disposal Area based on the test pit lithologic logs:

- Thirty percent is municipal refuse (60 percent of which is combustible household trash, wood, and partially incinerated refuse and 40 percent noncombustible drums, wire, and metal scraps).
- Forty percent is soil or sand and gravel.
- Thirty percent is ash or ashy fill.

The refuse and soils are assumed to have a moisture content of about 20 percent. Wastes and soils excavated below the water table or from perched zones may require dewatering and treatment. Leachate from temporary storage would also require treatment.

Thermal Treatment. The portable rotary kiln would be used to incinerate material from the Liquid Disposal Area. The incinerator system would consist of a kiln, an afterburner for solids destruction, and a venturi scrubber for emissions control. Incineration of the Liquid Disposal Area contents will require extensive material handling. Wastes must generally be crushed or shredded to 2 inches or less for efficient combustion. Wastes would be segregated to remove noncombustible material and incompatible wastes. Noncombustible waste material would be steamed cleaned and shredded, if necessary and redisposed of in the Liquid Disposal Area prior to its closure.

An enclosed building would be constructed near the feel line of the incinerator for staging and sorting excavated wastes. A shredder, vibrating screen, and electric magnet would be provided to separate and reduce the size of wastes. The building would also provide a stockpile area for the processed waste because wastes can be excavated at a rate faster than the rate of incineration. The size of the stockpile building will limit the quantity of waste material that can be safely stored, thus limiting the length of time that waste can be excavated. Schedules must be carefully planned and periodically adjusted so that material is always available for incineration without exceeding stockpile capacity. The actual size of the stockpile building should strike a balance between costs incurred by mobilization/demobilization and building cost, while assuring that project schedule will be met.

Municipal refuse usually has sufficient heating value to sustain combustion, but blending of refuse with contaminated soil may require supplemental fuel to maintain operating temperatures. The heating value of the municipal waste and soil was assumed to be about 3,400

Btu/lb. Liquids found in seeps or drums would be sampled and then incinerated. Burner blocks would be used for firing liquids into the kiln or afterburner. The residual ash would be collected, stabilized, and placed back in excavated areas. The Liquid Disposal Area would then be capped with a double-barrier cap once all the wastes have been incinerated.

The time to incinerate the wastes was estimated assuming continuous operation of the kiln at a feed rate of 3.4 tons per hour for 290 days annually (80 percent operating efficiency). Continuous operation would reduce thermal stress on the refractory lining in the kiln although downtime for failure, repair, and maintenance was allowed. A single unit would take the following number of years to treat following volumes of combustible wastes and solids:

Area	Volume Incinerated (cu yd)	Weight Incinerated (tons)	Operation (yr)
1	81,500	68,400	2.9
2	40,700	24,200	1.4
3	122,200	102,600	4.3

The time estimates do not include time for siting, meeting technical requirements of permitting, mobilization, and startup of the treatment facility, which could take 1 to 2 years. The overall economy of scale from multiple units is generally not significant, but if desired, the operating schedule could be shortened.

High levels of nitrogen oxide and sulfur oxide emissions are commonly formed when a rotary kiln is operated at high temperatures. Emissions and particulate matter depend on the waste material and the auxiliary fuel. A wet scrubber is assumed to be necessary for control of emissions and particulates.

The scrubber blowdown treatment system would consist of precipitation, flocculation, sedimentation, and filtration. Hydroxide precipitation would be accomplished by adding lime to the influent. Heavy metal hydroxides would precipitate from solution along with calcium, magnesium, iron, manganese, and barium. A coagulant such as alum or a polymer could be added to agglomerate particles and enhance settling. Flocculation and clarification (sedimentation) would follow and could be accomplished in one basin. Sludge removed from the clarifier could be thickened or dewatered for disposal in the Liquid Disposal Area and some could be recycled back into the sedimentation basin to enhance settling. A sand or multimedia filter would remove most of the remaining suspended solids. Effluent from the filter could be used for filter backwashing, and the filter backwash wastewater could be added to the clarifier.

Operations of the kiln would require approximately 150 gallons of supplemental fuel per hour because of the moderate heating value of the waste. Power requirements for the complete system would be 250 kW per hour. Water requirements would vary depending on the type of kiln, quenching requirements, and emissions control system. Approximately 24 gpm was assumed for a venturi scrubber system.

Groundwater Collection and Treatment. The representative groundwater collection and treatment alternative discussed previously would be implemented for this alternative.

IX. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

SOUTH LANDFILL

SHORT-TERM EFFECTIVENESS

Noise, dust, and risk to the surrounding community from vehicular accidents would occur during construction of soil cover or cap. The nuisance impacts and safety concerns vary between the alternatives with the amount of truck traffic. Alternative A2 would require 7,300 truck trips and Alternative A3 would require about 10,000.

Dust control (e.g., water spray) may be necessary to manage inhalation risks during cap or cover construction for Alternatives A2 and A3. General construction safety precautions would be taken for all construction alternatives to protect workers. Greater protection may be required when boring through landfill refuse for installation of gas vents. The time required for designing, procurement, and construction may increase slightly with increasing complexity of the containment alternative. The quality of the aquatic habitat may be temporarily diminished as a result of erosion from construction.

Erosion control measures would be taken to minimize this impact. Dikes, matting and berms could be used.

LONG-TERM EFFECTIVENESS

In general, long-term effectiveness increases from Alternative A1 to A3. Assuming proper maintenance of the containment systems described in alternatives A-2 and A-3, the risk from direct contact would decrease only slightly with increased containment system thickness. Under the no-action alternative, contaminants could be transported through the landfill contents into the groundwater. Infiltration and leachate generation would decrease with increasing containment controls.

Evaluations of cover and cap efficiencies for all the alternatives were performed using the Hydrologic Evaluation of Landfill Performance (HELP) model. Based on HELP model evaluations, Alternatives A2 would reduce infiltration by 70 percent and Alternative A3 by 90 percent relative to Alternative A1. The long-term effectiveness of each alternative is proportional to the impermeability of the containment system. All alternatives can adequately meet their performance specifications assuming proper installation and maintenance of the containment system and enforcement of property use restrictions.

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME

Treatment alternatives were not considered for the South Landfill because of the high costs to remove large volumes of wastes and the risks to workers associated with excavation of landfill contents. The short-term risks and remedial costs may be greater than the long-term risk reduction benefits from treatment.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Protection against the likelihood of direct contact with contaminated surface soils increases from alternative A1 to A3. The protection against potential risks from exposure to subsurface waste and soil would be the same for all alternatives and would depend on the enforcement of property use restriction to prevent site development. The potential for migration of contaminants from the waste and soil to the groundwater decreases with increased containment layers and layer thickness.

IMPLEMENTABILITY

All construction alternatives could be implemented to meet required performance standards with few difficulties. However, as the complexity of the containment system increases, so does the time and effort required to implement it. The materials for construction are generally available from local suppliers. Construction activities and institutional restrictions for all alternatives would be coordinated with the Ohio EPA and the Miami County Development Department.

ESTIMATED COST

Cost estimates and the present worth analysis are summarized on Table 11.

COMPLIANCE WITH ARARs

On the basis of site history and analytical evidence, the South Landfill meets the definition of a sanitary landfill and will be closed accordingly. State of Ohio rules concerning final cover and monitoring of sanitary landfills are considered the key applicable regulations for the South Landfill.

The most notable and applicable rules in the Ohio Revised Code are OAC 3745-27-09 Sanitary Landfill Operations, OAC 3745-27-10 Closure of Sanitary Landfills, and OAC 3745-27-12 Explosive Gas Monitoring for Sanitary Landfills. OAC 3745-27-09 contains most of the substantive (design-related) requirements, especially final cover requirements for sanitary landfills, stating under 3745-27-09(f)(3):

> A well compacted layer of final cover material shall be applied to all exposed surfaces of a cell upon reaching final elevation. The final cover material shall be applied in such amounts that all waste materials are covered to a depth of at least 2 feet.

The nature of the required final cover is described under 3745-27-09(F)(3). Other notable requirements are included under 3745-27-09(G), (H), and (I), which outline procedures for post-closure maintenance and monitoring.

In addition to these regulations, proposed regulations which are expected to be fully promulgated before cap design reaches 60 percent complete, are to be considered in the cap design.

Substantive rules regarding closure under OAC 3745-27-10 largely parallel those found in OAC 3745-27-09. However, OAC 3745-27-10 contains several administrative requirements regarding permits, licenses, files, and so on. Such administrative rules are not considered applicable or relevant and appropriate to CERCLA actions that occur entirely onsite.

Alternative A1—No Action

RI data did not indicate that chemical-specific ARARs for water on health-based action levels for soil were exceeded in the South Landfill. However, Alternative A1 fails to satisfy minimum Ohio sanitary landfill closure regulations (discussed above) and does not comply with action-specific ARARs.

Alternative A2—Compacted Soil Cover

Alternative A2 would not meet the minimum substantive requirements of the Ohio Administrative Code pertaining to closure of a sanitary landfill (OAC 3745-27-09 and -10). Therefore, Alternative A2 does not comply with ARARs for closure of the South Landfill.

Alternative A3—Single-Barrier Cap

Site records indicate that materials placed in the landfill were industrial and municipal wastes. The State sanitary landfill closure law is the primary ARAR for this area of the site.

The single-barrier cap would include 2 feet of clay compacted to a maximum permeability of 1×10^{-7} cm/s. This permeability would satisfy current State of Ohio policy regarding performance of sanitary landfill cover. The state design policy does not have the status of an ARAR (i.e., it is not a promulgated rule in the Ohio Administrative Code), but is a widely-applied state landfill design standard to be considered.

NORTH LANDFILL

SHORT-TERM EFFECTIVENESS

The short-term effectiveness of remediation of the North Landfill would be the same as that of the South Landfill. Emissions of hazardous constituents are not expected to be great since excavation of landfill materials would be limited and significant amounts of hazardous wastes outside the liquid disposal area are not suspected. Alternative B4 has about

double the truck traffic (15,000 loads) of Alternative B2 and would produce greater nuisance impacts and safety concerns.

LONG-TERM EFFECTIVENESS

The long-term effectiveness of remediation of the North Landfill would be the same as that for the South Landfill. In general, long-term effectiveness increases from Alternative B1 to Alternative B4. Infiltration and leachate generation were evaluated for all containment alternatives using HELP mode. Based on HELP model evaluations, Alternatives B2, B3, and B4 would reduce infiltration by 70 percent, 90 percent, and more than 99.99 percent, respectively, relative to the no-action alternative. The redundancy of a double-barrier cap offers greater reliability in reducing infiltration and subsequent contaminant leaching to groundwater if one barrier fails.

Although Alternative B4 would be the most effective alternative for reducing the potential for contaminant migration to the groundwater, the amount of contaminants in the North Landfill (excluding the Liquid Disposal Area) is not expected to be significant. Historical and sampling evidence obtained thus far indicates, the greater effectiveness of Alternative B4 in reducing infiltration may not result in discernible groundwater contaminant reductions compared to Alternatives B2 and B3.

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME

The reduction of toxicity, mobility, and volume is not applicable to the North Landfill because no treatment alternatives were considered for that operable unit.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Overall protection of human health and the environment would be the same for the North Landfill as for the South Landfill. The potential for migration of contaminants from the waste and soil to the groundwater would decrease with increasing cap layers and layer thickness from Alternatives B2 to B3, and B3 to B4.

IMPLEMENTABILITY

The implementability of remedial alternatives for the North Landfill would be the same as that for the South Landfill. As the complexity of the containment system increases, so does the time and effort required to implement the alternative. Alternative B4 would require the greatest exercise of quality control during construction to ensure that synthetic liner seams are properly sealed. This may require a specialty contractor, but such services are reasonably available.

ESTIMATED COST

Cost estimates and the present worth analysis for the North Landfill alternatives are summarized on Table 12. The general inspection and maintenance costs are the same for the three containment alternatives. The total present worth of each alternative increases with the greater degree of protectiveness.

COMPLIANCE WITH ARARs

Historical records suggest that disposal of liquid wastes in the North Landfill (outside the Liquid Disposal Area) was limited. This evidence is not conclusive however, and the volume and toxicity of hazardous substances in the North Landfill is unknown.

The North Landfill is adjacent to the Liquid Disposal Area. The poorly defined boundary of the Liquid Disposal Area creates additional uncertainty about the nature and distribution of buried wastes in the North Landfill. Also, the North Landfill reportedly contains large volumes of incinerator ash, which, if comparable to ash found in the Ash Pile and Ash Disposal Pit, may fail EP toxicity hazardous waste characteristic tests under 40 CFR 261 (based on metal concentrations found in other onsite wastes containing ash).

Compliance with action-specific ARARs for the North Landfill is dependent on information and assumptions regarding the nature of buried wastes. Primarily, nonhazardous wastes are assumed to be present throughout the North Landfill, and the State of Ohio regulations pertaining to closure of sanitary landfills are relevant and appropriate (OAC 3745-27-09 and -10). Those regulations are discussed under the evaluation of alternatives for the South Landfill.

Alternative B1—No Action

RI data did not indicate that chemical-specific ARARs for water or health-based action levels for surface soil were exceeded in the North Landfill. However, Alternative B1 fails to satisfy the minimum state landfill closure regulations and does not comply with ARARs.

TABLE 11
COST ESTIMATE SUMMARY FOR THE SOUTH LANDFILL
MIAMI COUNTY INCINERATOR SITE

DESCRIPTION	ALTERNATIVE	
	A2	A3
Soil Cover	$ 980,000	$ 0
Single-Barrier Cap (a)	0	1,929,000
Allowances (b)	118,000	232,000
Contingencies (c)	275,000	540,000
Other Indirect Capital Costs (d)	206,000	405,000
Engineering/Design	146,000	279,000
TOTAL CAPITAL COST	$1,725,000	$3,385,000
PRESENT WORTH OF O&M COSTS (e)	574,000	751,000
TOTAL PRESENT WORTH ESTIMATE (f)	$2,300,000	$4,100,000

(a) The configuration of the single-barrier capping system described in the FS has been modified as described in the ROD. These estimated costs are for the modified cap system.

(b) Mobilization/demobilization, bond and insurance, temporary facilities, and field detail allowance.

(c) Bid and scope contingencies.

(d) Administrative, legal, and permitting services to meet substantive requirements and services during construction.

(e) Present worth estimate assumes a discount rate of 5 percent annually over 30 years.

(f) Cost estimate is order-of-magnitude level with expected accuracy of +50 percent to -30 percent. Total present worth estimate is rounded to two significant figures.

NOTE: More detailed capital cost and O&M cost estimates are presented in Appendix B of the FS Report.

Alternative B2--Compacted Soil Cover

Alternative B2 would not meet the minimum substantive requirements of the Ohio Administrative Code pertaining to closure of a sanitary landfill (OAC 3745-27-09 and -10).

Alternative B3--Single-Barrier Cap

Alternative B3 uses a cap design identical to that specified for Alternative A3 for the South Landfill. The evaluation of compliance of Alternative A3 with ARARs applies similarly to the North Landfill. The single-barrier cap design is more stringent than that required by Ohio solid waste regulations alone and complies fully with commonly applied State of Ohio design policy for capping of a sanitary landfill. It also complies with minimum federal regulations for hazardous waste landfill cover design as outlined under 40 CFR 265.310. However, it is less stringent than current federal guidance outlined in RCRA Guidance Document for Landfill Design - Liner Systems and Final Cover.

Alternative B4--Double-Barrier Cap

Alternative B4 would comply with ARARs if the North Landfill were closed as a hazardous waste landfill. Available evidence does not suggest that it warrants such treatment. The double-barrier cap would meet current performance requirements under 40 CFR 265.310 and current U.S. EPA minimum technology guidance.

ASH DISPOSAL PIT AND ASH PILE

SHORT-TERM EFFECTIVENESS

None of the alternatives poses short-term risks to the community or the environment that cannot be controlled with routine precautions. Dust control may be required, particularly with Alternatives C3 and C4 when ash wastes are excavated, loaded into dump trucks or mixing equipment, and unloaded into the North Landfill. Dust generated during implementation of Alternative C4 would be reduced once wastes are stabilized. Workers may require personal protection against dust inhalation only for Alternatives C3 and C4. The time required to implement alternatives increases from Alternatives C2 and C4. However, all alternatives could be implemented within 2 years.

LONG-TERM EFFECTIVENESS

Alternative C2, capping the Ash Pile and the Ash Disposal Pit, would reduce the potential risks from direct contact with lead.

The potential for severe erosion or washout was addressed because the Ash Pile lies within the 100-year flood plain. The degree of flood protection provided by remedial alternatives increases from no

TABLE 12
COST ESTIMATE SUMMARY FOR THE NORTH LANDFILL
MIAMI COUNTY INCINERATOR SITE

DESCRIPTION	ALTERNATIVE		
	B2	B3	B4
Soil Cover	$1,001,000	$ 0	$ 0
Single-Barrier Cap (a)	0	1,955,000	0
Double-Barrier Cap	0	$ 0	2,546,000
Allowances (b)	120,000	235,000	306,000
Contingencies (c)	280,000	548,000	713,000
Other Indirect Capital Costs (d)	210,000	411,000	535,000
Engineering/Design	149,000	282,000	365,000
TOTAL CAPITAL COST	$1,760,000	$3,431,000	$4,465,000
PRESENT WORTH OF O&M COSTS (e)	586,000	766,000	1,471,000
TOTAL PRESENT WORTH ESTIMATE (f)	$2,300,000	$4,200,000	$5,900,000

(a) The configuration of the single-barrier capping system described in the FS has been modified as described in the ROD. These estimated costs are for the modified cap system.

(b) Mobilization/demobilization, bond and insurance, temporary facilities, and field detail allowance.

(c) Bid and scope contingencies.

(d) Administrative, legal, and permitting services to meet substantive requirements and services during construction.

(e) Present worth estimate assumes a discount rate of 5 percent annually over 30 years.

(f) Cost estimate is order-of-magnitude level with expected accuracy of +50 percent to -30 percent. Total present worth estimate is rounded to two significant figures.

NOTE: More detailed capital cost and O&M cost estimates are presented in Appendix B of the FS Report.

protection for Alternative C1 to soil stabilization with erosion control matting for Alternatives C2, and complete removal of wastes from the flood plain for Alternatives C3 and C4.

The leachability of ash waste is limited by the relatively immobile nature of the contaminants. The effective long-term prevention of leachate migration from ash sources increases marginally from Alternatives C1 to C4. The incremental risks posed by consolidating wastes in the North Landfill (Alternatives C3 and C4) are insignificant compared to existing risks.

Alternative C2 would require the greatest degree of long-term inspection and maintenance to prolong the cap integrity. No operations or maintenance is associated with either Alternative C3 or C4 because the wastes from the Ash Disposal Pit and Ash Pile would be consolidated with those in the North Landfill and would not require special care beyond that provided for the landfill contents.

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME

No treatment process would be used in Alternatives C1 through C3, so they would not reduce toxicity, mobility or volume of contaminants. The fixation treatment in Alternative C4 would reduce the potential for contaminants to leach or migrate from the treated wastes. Fixation was assumed to increase the volume of ash by 30 percent and cause no reduction in toxicity.

The low mobility of the inorganic contaminants and the consolidation of wastes into the North Landfill beneath a cap make this a minor advantage over Alternative C3.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The effectiveness of reducing the potential for erosion or washout of the Ash Pile from floods is a good indicator of overall protection. Alternative C2 would reduce the potential for erosion or washout and alternatives C3 and C4 would reduce those risks even further. Treatment of the wastes offers further protection, however, existing risks from the North Landfill must be evaluated when considering the incremental protection of treatment.

IMPLEMENTABILITY

All alternatives can be routinely constructed with conventional construction equipment. Alternatives C4 would require laboratory and pilot-scale studies before or during remedial design to determine the quantities of stabilization/fixation reagents required. Services and materials for each alternative are readily available. Institutional actions require coordination with local authorities and capping requires state participation and enforcement. Coordination with governmental agencies would not be necessary following implementation of Alternatives C3 and C4 assuming they would result in clean closure of the Ash Disposal Pit and Ash Pile.

ESTIMATED COST

Cost estimates and present worth analysis for the Ash Pile and Ash Disposal Pit alternatives are summarized on Table 13. the total present worth of Alternative C2 is an order of magnitude less than that of Alternative C3. Alternative C2 includes post-closure costs, but the consolidation alternatives do not include annual O&M costs for the Ash Pile or Ash Disposal Pit. Treating the ash before consolidation (Alternative C4) doubles the cost of consolidation without treatment (Alternative C3).

COMPLIANCE WITH ARARs

Concentrations of inorganics in surface soil samples from the Ash Pile and subsurface soil samples from the Ash disposal Pit exceeded health-based action levels. Concentrations of organics in subsurface soil samples from the Ash Disposal Pit also exceeded health-based action levels.

Since the Ash Pile is located on the 100-year flood plain, two location-specific requirements apply:

- 40 CFR 265.18(b)—Locational Standards, Flood Plains, which requires that hazardous waste management facilities be designed, constructed, operated, and maintained to avoid washout.
- 40 CFR 6 Appendix A—Statement of Procedures on Flood Plain Management and Wetland Protection, which sets forth U.S. EPA policy on flood plain management and protection of wetlands.

Compliance with action-specific ARARs for the Ash Pile and Ash Disposal Pit is governed by the assumption that the wastes are hazardous. Closure performance standards under 40 CFR 265.111, landfill cap design requirements under 40 CFR 265.111, and post-closure maintenance and monitoring requirements under 40 CFR 265.117 are relevant and appropriate to actions that allow the ash to remain in place. Several substantive rules under 40 CFR 265 Subpart L—Waste Piles are considered relevant and appropriate to actions at the Ash Pile.

Closure of a waste pile under the regulations of Subpart L requires removal and subsequent disposal of the hazardous material. According to 40 CFR 265.258—Closure and Post-Closure Care, all contaminated media at the location of a former hazardous waste pile must be decontaminated or the area must be closed and managed in accordance with regulations for landfills under 40 CFR 265 Subpart N—Landfills. A discussion of landfill closure regulations can be found within the evaluations for the North and South Landfills.

Other substantive action-specific ARARs for the Ash Pile and Ash Disposal Pit apply to the subsequent handling of excavated ash. These requirements are discussed below under the applicable remedial alternatives.

Removal of ash and soils from the Ash Pile and Ash Disposal pit will be accomplished to background levels for lead, cadmium, chromium, barium, arsenic, zinc, PCBs and dioxins provided that all other contaminants present will in no case exceed a 10^{-6} total lifetime risk level for carcinogens and must have a hazard index of less than one for non-carcinogens. Background levels for inorganics can be found in Appendix J Tables J-1 and J-2 of the RI report. Background levels for organics are considered to be nondetectable.

Alternative C1--No Action

Alternative C1 fails to comply with applicable ARARs identified for the Ash Pile and Ash Disposal Pit operable unit. RI data indicate that health-based action levels for contaminated soil were exceeded at those locations, and Alternative C1 would not address the potential health risks and fail to satisfy substantive regulations for closure of waste piles and landfilled hazardous waste. It would also leave the Ash Pile in a location that is vulnerable to washout during floods.

Alternative C2--Single--Barrier Cap

Alternative C2 would comply with ARARs for landfilling of a hazardous waste. The single-barrier cap would comply with the minimum regulations for hazardous waste landfill cap design under 40 CFR 265.310. It would not comply with the minimum technology guidance for hazardous waste cap design.

The erosion control matting used under Alternative C2 would comply with the requirements of 40 CFR 265.18(b)--Locational Standards, Flood Plains.

Alternative C3--Consolidation Without Treatment

Alternative C3 would comply with the requirements for closure and post-closure care of waste piles under 40 CFR 265.258 if the waste is not EPToxic. The use of common backfill to cap former ash-containing areas assumes that the locations will have been cleaned up to background. If hazardous materials remain, the locations would have to be closed according to ARARs applicable to closure of a hazardous waste landfill.

Regulations regarding land disposal restrictions of characteristic hazardous waste under 40 CFR 268 may be promulgated by 1990. If land disposal of the ash is restricted, then some form of treatment--probably stabilization--would be required before land disposal if the waste fails the EPToxic test.

TABLE 13
COST ESTIMATE SUMMARY FOR THE ASH PILE AND ASH DISPOSAL PIT
MIAMI COUNTY INCINERATOR SITE

DESCRIPTION	ALTERNATIVE		
	C2	C3	C4
Health and Safety Program	$ 0	$ 37,000	$ 48,000
Single-Barrier Cap (a)	151,000	0	0
Remove and Consolidate	0	606,000	0
Remove, Solidify, and Consolidate	0	0	1,489,000
Backfill	0	208,000	208,000
Allowances (b)	169,000	122,000	255,000
Contingencies (c)	42,000	389,000	800,000
Other Indirect Capital Costs (d)	32,000	204,000	420,000
Engineering/Design	22,000	137,000	314,000
TOTAL CAPITAL COST	$ 265,000	$1,703,000	$3,534,000
PRESENT WORTH OF O&M COSTS (e)	79,000	0	0
TOTAL PRESENT WORTH ESTIMATE (f)	$ 340,000	$1,700,000	$3,500,000

(a) The configuration of the single-barrier capping system described in the FS has been modified as described in the ROD. These estimated costs are for the modified cap system.

(b) Mobilization/demobilization, bond and insurance, temporary facilities, and field detail allowance.

(c) Bid and scope contingencies.

(d) Administrative, legal, and permitting services to meet substantive requirements and services during construction.

(e) Present worth estimate assumes a discount rate of 5 percent annually over 30 years.

(f) Cost estimate is order-of-magnitude level with expected accuracy of +50 percent to -30 percent. Total present worth estimate is rounded to two significant figures.

NOTE: More detailed capital cost and O&M cost estimates are presented in Appendix B of the FS Report.

Alternative C4—Consolidation with Treatment

Considerations regarding ARAR compliance under Alternative C4 are identical to those discussed under Alternative C3 except that Alternative C4 includes a plan for treating the ash before placement in the North Landfill. If land disposal restrictions are promulgated before the remedial action begins, waste analysis and testing would be necessary to ensure compliance with the treatment standards specified under 40 CFR 268 Subpart D.

LIQUID DISPOSAL AREA AND GROUNDWATER

SHORT-TERM EFFECTIVENESS

Impacts on the surrounding communities during construction activities are not expected to be great. Noise and dusts resulting from truck traffic would be similar under Alternatives D2, D3, and D4. Impacts to the community from Alternative D5 may be greater because of the excavation and handling of the wastes in the Liquid Disposal Area. Likewise, risk to workers would be substantially greater under Alternative D5 than the other alternatives because of potential exposure to hazardous wastes during excavation staging and incineration. If proper health and safety precautions for protective clothing and air monitoring are taken, those risks can be minimized. Health and safety protection would also be necessary for workers involved in groundwater or soil vapor treatment. Greater operations controls and monitoring would be required to verify that implementation does not pose unacceptable risks to the community, site workers, or the environment. As waste handling increases, the time until remedial action objectives are achieved also increases.

Risks to personnel operating the onsite air stripper for groundwater treatment are not expected to be significant. Proper health and safety precautions as well as air monitoring would minimize risks. Likewise, risks to operators at the City of Troy POTW are not expected to be significant because the concentrations of VOCs will be low when diluted with the normal plant influent flow.

LONG-TERM EFFECTIVENESS

In general, long-term effectiveness increases from Alternative D1 to Alternative D5. Alternative D2, which relies on institutional restrictions, containment, and monitoring, would be the least reliable in its long-term effectiveness. While all alternatives rely on controls to some degree or for some time period, reliance on controls is the least for Alternative D5, followed by Alternatives D4 and D3.

The time required to achieve 90 percent reduction in groundwater VOC contamination by pumping the onsite downgradient wells would be the same for Alternatives D3, D4, and D5—about 15 years for the upper aquifer and 8 years for the lower aquifer. The time estimates for contaminant reduction are presented only for comparison. Since they are based on many simplifying assumptions, actual times may be different. The time necessary to achieve 90 percent VOC reduction in groundwater downgradient of the Liquid Disposal Area under Alternatives D1 and D2 was not estimated because the source of contamination would remain under those alternatives. While capping could result in a substantially reduced contaminant load to groundwater compared to no action, the presence of significant VOC contamination near the water table may result in a continuing source of contamination to the aquifer as the water table fluctuates over time. VOCs could continue to exceed MCLs in the aquifer for more than 70 years under Alternatives D1 and D2.

The time necessary to achieve 90 percent reduction in groundwater VOCs beneath the Liquid Disposal Area varies between Alternatives D3, D4, and D5. Capping alone, as in Alternative D3, may not effectively control the source of VOC contamination to the groundwater. Thus, the time to achieve 90 percent reduction in VOCs cannot be estimated and pumping may be required indefinitely. Under Alternative D5 the source of contamination would be effectively removed by excavation, and the time to achieve 90 percent reduction of groundwater contamination is estimated at 6 years for those wells located near the Liquid Disposal Area. Under Alternative D4, the source of VOC contaminants is removed from both the unsaturated and saturated zones. Vapor extraction is expected to enhance groundwater pumping and the achievement of 90 percent reduction in groundwater VOCs; however, it is difficult to quantify the effectiveness of vapor extraction and the influence on the groundwater collection system.

Under Alternative D4A, contaminants would not be removed from below the water table with the soil vapor extraction system. As a result the time necessary to achieve 90 percent reduction in groundwater VOCs beneath the Liquid Disposal Area may be similar to Alternative D3.

The potential for the future release of additional contaminants to the groundwater decreases with greater reduction of waste toxicity, mobility, and volume. For example, vapor extraction may remove a high percentage of VOCs but will not remove all VOCs and will not remove significant amount of nonvolatile contaminants. While VOCs represent the greatest groundwater contamination concern, contaminants not removed by vapor extraction could be released in the future if the cap failed. Incineration would destroy VOCs and nonvolatile organic contaminants but would not destroy metals, which would remain in the ash.

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME

Alternative D4 and D5 involve treatment operations that achieve reductions of toxicity, mobility, and volume of contaminants in the Liquid Disposal Area. Alternatives D3, D4 and D5 include groundwater treatment, which would reduce contaminant mobility. The toxicity of VOCs in the collected groundwater is reduced when the air stripper emissions of Alternatives D3, D4, and D5 are absorbed onto carbon and later destroyed during carbon regeneration. The POTW treatment of groundwater would also reduce the concentrations and toxicity of the contaminants, although not all contaminants would be destroyed. Some would be volatilized during aeration in the activated sludge tanks, and some would be adsorbed onto the sludge of the POTW. Because the VOC mass loading contributed from the site is expected to be a small percentage of VOCs in typical POTW influents, volatilization and adsorption are not expected to be a concern. Alternatives D1 and D2 have no provisions for treatment.

Alternative D4 would decrease VOC concentrations in waste and soil (including aquifer media) by approximately 90 percent. The estimated VOC mass in the Liquid Disposal Area is 33,000 pounds. Assuming these preliminary VOC mass and removal efficiencies are correct, an estimated 30,000 pounds of VOCs would be removed. Based on available literature from field experience, vapor phase carbon treatment would remove more than 98 percent of the VOCs in the air stream. If the adsorptive capacity of activated carbon is assumed to be 0.15 pound of VOCs per pound of carbon, approximately 200,000 pounds of carbon would require regeneration at an offsite facility.

Alternative D4A would decrease VOC concentrations in the unsaturated zone by about 90 percent. The mass of VOCs removed by the vapor extraction system would be less than the amount removed under Alternative D4 because dewatering is not being considered. The VOCs adsorbed on the aquifer matrix would be removed through groundwater extraction only. Estimates of the VOC mass adsorbed on the aquifer matrix beneath the Liquid Disposal Area were not made because of limited data.

Alternative D5 would destroy more than 99 percent of the volatile and nonvolatile organic contaminants in an estimated 78,000 cubic yards of contaminated waste and soil (assuming the Liquid Disposal Area is 100,000 square feet). Incineration would reduce the volume of contaminated materials by approximately 20 percent. Incineration residues would consist of approximately 61,000 cubic yards of ash and soils and an undetermined volume of scrubber fly ash.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

All of the alternatives would protect human health and the environment. The overall degree of protection takes short-and long-term effectiveness into consideration. The difference between alternatives in short-term risks to workers, the community, and the environment are not great relative to differences in long-term effectiveness.

The principal protection benefit of treating the wastes in the Liquid Disposal Area would be reduced leaching of contaminants to the groundwater, resulting in more rapid long-term remediation of contaminated groundwater and reduced reliance on containment or institutional restrictions. The permanence of source controls and

TABLE 14
COST ESTIMATE SUMMARY
FOR THE LIQUID DISPOSAL AREA AND GROUNDWATER
MIAMI COUNTY INCINERATOR SITE

DESCRIPTION	ALTERNATIVE				
	D2	D3	D4	D4A	D5
Health and Safety	$ 0	$ 37,000	$ 46,000	$ 46,000	$ 362,000
Site Preparation	0	145,000	165,000	106,000	643,000
Cap (a)	423,000	423,000	348,000	423,000	398,000
Groundwater Collection System	0	251,000	295,000	276,000	251,000
Groundwater Treatment	0	126,000	126,000	3,000	126,000
Temporary Cap	0	0	85,000	0	0
Soil Vapor Extraction System	0	0	342,000	254,000	0
Vapor Phase Treatment	0	0	980,000	980,000	0
Excavation	0	0	0	0	3,445,000
Material Processing	0	0	0	0	1,836,000
Onsite Incineration	0	0	0	0	18,350,000
Backfill	0	0	0	0	565,000
Allowances (b)	51,000	161,000	231,000	181,000	3,191,000
Contingencies (c)	119,000	457,000	1,309,000	1,135,000	14,584,000
Other Indirect Capital Costs (d)	89,000	288,000	707,000	613,000	7,875,000
Engineering/Design	60,000	161,000	514,000	461,000	4,469,000
TOTAL CAPITAL COST	$ 742,000	$ 2,049,000	$ 5,148,000	$ 4,478,000	$ 56,095,000
PRESENT WORTH OF O&M COSTS (e)	1,822,000	4,213,000	4,213,000	3,149,000	4,213,000
TOTAL PRESENT WORTH ESTIMATE (f)	$ 2,600,000	$ 6,300,000	$ 9,400,000	$ 7,600,000	$ 60,000,000

(a) Alternatives D2 through D5 include a double-barrier cap system.

(b) Mobilization/demobilization, bond and insurance, temporary facilities, and field detail allowance.

(c) Bid and scope contingencies.

(d) Administrative, legal, and permitting services to meet substantive requirements and services during construction.

(e) Present worth estimate assumes a discount rate of 5 percent annually over 30 years.

(f) Cost estimate is order-of-magnitude level with expected accuracy of +50 percent to -30 percent. Total present worth estimate is rounded to two significant figures.

NOTE: More detailed capital cost and O&M cost estimates are presented in Appendix B of the FS Report for Alternatives D2, D3, D4 and D5. Alternative D4A was developed after receipt of public comments and was not part of the FS.

reductions in time required to remediate groundwater serve as the primary indicators of overall protection.

The estimated time required to achieve 90 percent reduction in groundwater VOC contamination was discussed above. In summary, Alternatives D1 and D2 would require restrictions on the use of the aquifer for drinking water for as much as 70 years. Onsite cleanup of groundwater contamination would be achieved most quickly under Alternative D4, and Alternative D4A, followed by Alternatives D5 and D3. These predictions are based on available site data, technology literature, and models that require certain assumptions in the absence of data. While they serve as valuable indicators, their precision has limitations. Actual times required to reduce groundwater contamination beyond the property boundary, below Safe Drinking Water Act Maximum Contaminant Levels (MCLs) or other health or risk based levels can be determined only through monitoring of the implemented remedies.

IMPLEMENTABILITY

All of the Liquid Disposal Area and groundwater alternatives are technically and administratively feasible and require services or materials that are available. In general, waste treatment alternatives, particularly incineration, require more specialty contractors than containment. While those services are available, in most cases they are not unlimited. The actual availability of services required to implement a particular remedy may result in scheduling delays but will not eliminate the feasibility of that alternative.

The implementability of groundwater treatment under Alternative D4A at the Troy POTW is dependent on the City of Troy's willingness to accept the discharge and its ability to continue to meet NPDES requirements. If the City does not agree to accept the discharge, onsite treatment as described for Alternative D4 would be implemented.

ESTIMATED COST

Cost estimates and the present worth analysis for the Liquid Disposal Area and groundwater alternatives are summarized in Table 14. In general, costs increase with increased long-term effectiveness and overall protection, but the relationship of incremental effectiveness and protection to cost is not linear. Costs depend on assumptions made regarding waste characteristics and volume, conceptual plans for implementing alternatives, and operation and maintenance requirements. Therefore, careful evaluation of costs and cost-sensitive assumptions is necessary.

The sensitivity analysis was intended to assess the effect of variation of key assumptions associated with the cost of any remedial alternative. The cost sensitivity analyses performed for Alternatives D4 and D5 are presented in Appendix B of the Feasibility Study. The analysis for Alternative D4 illustrates the effect associated with changing the surface area of the Liquid Disposal Area, which varies the contaminant loading to the vapor extraction system. The analysis for Alternative D5 focused on variations in the volume of wastes to be incinerated.

COMPLIANCE WITH ARARs

Groundwater samples from monitoring wells downgradient of the Liquid Disposal Area indicate that concentrations of several contaminants exceed MCLs. One residential well sample contained 1,1-dichloroethene at a concentration that exceeded the MCL. Health-based action levels for contaminated soils were also exceeded in some subsurface soil samples from the Liquid Disposal Area. These results indicate that the Liquid Disposal Area and groundwater operable unit does not comply with chemical-specific ARARs for drinking water and other ambient environmental standards to be considered. MCLs are considered relevant and appropriate for the Liquid Disposal Area and groundwater operable unit because of three key analytical results:

- The aquifer containing contaminated groundwater is used as a source of drinking water.
- Analytical data for the Liquid Disposal Area and information about the groundwater contaminant plume indicate that continued contaminant releases and further plume migration are likely.
- Analytical modeling showed that contaminant concentrations in groundwater near the Great Miami River may increase during the next 25 to 30 years if no action is taken.

Substantive action-specific requirements for permanent closure of the Liquid Disposal Area involve many of the same regulations discussed above regarding closure of the North and South Landfill and Ash Pile and Ash Disposal Pit operable units. Use of other remedial technologies, however, such as water treatment and incineration, involve additional requirements, which are discussed below.

The aquifer in this area has been designated a sole-source aquifer under the Safe Drinking Water Act by the U.S. EPA. Implementation of the proposed remedy would serve to greatly reduce the contribution of contaminants from the site to this aquifer.

Alternative D1—No Action

Alternative D1 fails to comply with ARARs identified for the Liquid Disposal Area and groundwater operable unit. RI data indicate that MCLs in groundwater and health-based action levels for contaminated soil are exceeded in this operable unit. No action would fail to address potential health risks and fail to satisfy minimum substantive regulations for closure of hazardous waste landfills.

Alternative D2—Cap with Natural Groundwater Attenuation

Alternative D2 would comply with ARARs for closure of landfilled hazardous wastes. The double-barrier cap would meet current performance requirements under 40 CFR 265.310 and minimum technology guidance for covering of hazardous waste.

The natural groundwater attenuation strategy in Alternative D2 is based on SARA 121(d)—Degree of Cleanup. Subsection 121(d)(2)(B)(ii) of this rule outlines "a process for establishing alternate concentration limits" that is considered applicable to conditions observed at the Miami County Incinerator Site. The specific site conditions that apply—found under SARA 121(d)(2)(b)(ii)(I) and (III)—are:

- There are known and projected points of entry of contaminated groundwater into surface water.
- Statistically significant increases in contaminant concentration in the Great Miami River are not expected.
- The remedial action includes enforceable measures that will preclude human exposure to the contaminated groundwater at any point between the facility boundary and all known and projected points of entry of contaminated groundwater into surface water.

Under the new SARA criteria, Alternative D2 is considered a groundwater cleanup strategy that complies with both chemical-specific and action-specific ARARs. The conditions listed above appear to be satisfied given the specific groundwater contamination circumstances and the measures built into Alternative D2 to provide groundwater monitoring and alternative residential drinking water supply when needed.

Alternative D3—Double-Barrier Cap with Groundwater Treatment

Alternative D3 would comply with ARARs because it includes a cap that meets both current federal regulations (40 CFR 265.310) and minimum technology guidance, while it responds fully to the groundwater contamination issue. Relationships between ARARs and cap configuration are discussed above. However, the groundwater collection and treatment system, presents the need to examine some additional regulations.

Permit regulations under the NPDES (40 CFR 122) provide a set of rules related to treatment system discharges and therefore would greatly influence the design and operation of the groundwater treatment system. State NPDES regulations under OAC 3745-33 and Ohio Permit System Regulations under OAC 3745-31 are considered applicable to Alternative D3. Many administrative rules under those regulations are considered applicable to this action because it would affect offsite surface waters. The key requirement common to all these regulations is consultation with the state regarding use of best available technology for water treatment systems.

Key regulations considered applicable to air pollutant emissions from the proposed air stripping tower include 40 CFR 52 and 40 CFR 61. These regulations impose limits on VOC emissions and provide a procedure for review of reasonably available control technology for cases where the limits are exceeded. Regulations under 40 CFR 52 require coordination with the state regarding review of new air pollution sources. Proposed standards for VOC emissions under 52 FR 3748 do not yet have the status of ARARs but may serve as guidance to be considered for the design of the air stripping tower. Ohio's interim Air toxics Policy is also to be considered.

Alternative D4—Vapor Extraction and Cap with Groundwater Treatment

Regulations regarding groundwater treatment under Alternative D4 are applicable to the same extent as discussed under Alternative D3. Requirements pertaining to capping and closure of a hazardous waste landfill apply to final closure of the Liquid Disposal Area and groundwater operable unit. The double-barrier cap, installed following completion of vapor extraction, would comply with ARARs. The double-barrier cap is considered appropriate for final closure because the soil vapor extraction process—while effectively reducing the volume of VOCs—would not effectively remove nonvolatile contaminants from the operable unit.

The performance standards considered applicable to the soil vapor extraction technology are set forth under 40 CFR 264 Subpart X—Miscellaneous Units. These standards (40 CFR 264.601) generally require that the treatment technology be designed to reduce the volume the potential for migration of contaminants posing a risk to human health and the environment. The specific requirements of this performance standard, based on the review conducted for this FS, are consistent with the intent and design of Alternative D4. Therefore, the soil vapor extraction technology is considered to comply with ARARs.

VOC emissions from the soil vapor extraction unit would be similar to those from the air stripping technology described under Alternative D3, so the air emission regulations discussed under Alternative D3 would apply to Alternative D4.

Alternative D4A—Modified Vapor Extraction and Cap with Groundwater Treatment

Alternative D4A would comply with ARARs because it includes a single-barrier cap that meets current federal regulations (40 CFR 265.310) and state regulations (OAC 3745-27-09, 10, and 12 and proposed closure regulations 3745-27-11) while also responding fully to groundwater contamination. Performance standards applicable to the soil vapor extraction technology and groundwater cleanup would be as described for Alternative D4.

Discharge to the Troy POTW must meet the provisions of the Troy Sewer use ordinance described earlier. Pretreatment would be required if the provisions cannot be met. Discharge to the POTW must also meet state requirements for permitting (OAC 3745-31) and pretreatment regulations (OAC 3745-03). In addition, the discharge must meet pretreatment requirements of the federal Clean Water Act (40 CFR 403).

Alternative D5—Incineration with Groundwater Treatment

Regulations pertaining to groundwater treatment are discussed under Alternative D3. Actions unique to Alternative D5, including excavation, temporary storage, and incineration of hazardous materials require consideration of other regulations.

Substantive regulations under 40 CFR 264 Subpart I—Storage Containers—should be considered applicable when they concern temporary storage of hazardous wastes prior to incineration. Regulations related to permanent storage of hazardous wastes may be considered relevant and appropriate when they are deemed necessary for short-term protection of public health and the environment during cleanup. Regulations under 40 CFR 264 Subpart O—Incinerators would be considered applicable for incineration of hazardous wastes. Hazardous waste incinerator performance standards under 40 CFR 264.33 are considered prominent rules for this action. These standards require a 99.99 percent destruction and removal efficiency for principle organic hazardous constituents.

State of Ohio air pollution control regulations considered applicable to this action include rules under OAC 3745-15, -16, -17, and -21.

GROUNDWATER

A. Determination of Cleanup Standards

In accordance with EPA policy (See "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements," dated July 9, 1987) the Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act are generally the applicable or relevant and appropriate requirements for determining cleanup levels for groundwater. MCLs are first considered as cleanup standards for the groundwater. However, because of cumulative health risks, the MCLs may not be sufficiently protective of human health. Also, MCLs do not exist for many compounds. Therefore, health based standards of 1×10^{-5} cumulative excess lifetime cancer risk and a chronic hazard index not to exceed 1, are set as the groundwater cleanup standard at the waste boundary. A 1×10^{-5} risk level is considered appropriate only within the waste boundary where deed restrictions will prevent installation of wells. A 1×10^{-6} excess lifetime cancer risk must be met at the nearest receptor. In addition, the MCLs must, at a minimum, be met for a particular compound at both compliance points.

Although specific concentration levels required for cleanup are not established at this time, the cumulative risk calculation and the chronic HI calculation are dependant upon the concentrations present in the ground water. The health based standard allows for evaluating different contaminants at different concentrations that may be present in the groundwater at the time when the groundwater extraction system may be terminated. Different compounds will be removed from the groundwater preferentially. The mobility and original concentration of a contaminant will be among the factors that determine the time required for removal from the groundwater. Arriving at specific concentration levels for individual contaminants based on the cumulative health risk is consistent with the requirement for an ACL under RCRA because they are protective of human health and the environment and because of the direct relationship between the health based standard and an associated concentration level. The factors in 40 CFR Part 265.94(b) were considered when the cleanup standards were determined.

The cleanup standards are consistent with and more stringent than the water quality criteria for protection of human health for consumption of water only. U.S. EPA considers a cumulative excess cancer risk of 1×10^{-4} to 1×10^{-7} to be an acceptable risk range. The cleanup standard requires a cumulative excess cancer risk of 1×10^{-5} at the waste boundary, so excess cancer risks for all compounds must necessarily be within the 1×10^{-4} to 1×10^{-7} or below range identified in the water quality criteria document.

B. Compliance Points

The point of compliance for the ARARs, the 1×10^{-5} cumulative excess lifetime cancer risk level and the chronic HI of 1 is at and beyond the waste boundary; or from a practical standpoint, the edge of the cap. The remedial action includes a multi-media cap over the site. Deed restrictions restricting use of the site are a part of the remedial action. Therefore, the aquifers do not become actual or potential sources of drinking water until they reach the waste boundary. The waste boundary is therefore, an appropriate point of compliance for groundwater cleanup standards and is consistent with 40 CFR Section 264.95. A second compliance point for the MCLs, the 1×10^{-6} cumulative excess lifetime cancer risk and the chronic HI of less than 1 in the groundwater is the nearest receptor. Because use of the groundwater can occur beginning adjacent to the waste boundaries, compliance points are the same. The compliance points apply to both the shallow and deep aquifers.

C. Technical Impracticability

The possibility exists of not being able to technically meet the cleanup levels. Therefore, provisions for making such a claim must be carefully developed. Section 121(b)(2) of SARA allows for a waiver. Generally the approach to a waiver of the cleanup levels based on technical impracticability should be based on information developed during the operation of the selected groundwater extraction and treatment system. A monitoring program must be carefully designed to develop needed information. This information must then be evaluated from both an overall qualitative perspective and a quantitative perspective. The qualitative evaluation should include, among other things, water quality at extraction and monitoring wells, possible modifications to the extraction system that could help achieve cleanup levels, and an endangerment assessment of the impact of discontinuing operation of the extraction system. The quantitative evaluation should consider, among other things, a statistical analysis of contaminant concentrations over time and the cumulative mass of contaminants being removed by the extraction system compared to the mass of contaminants remaining in the aquifer. The groundwater model developed as a part of the RI must be calibrated and verified for contaminant mass transport to aid in predicting aquifer behavior and determining if cleanup levels are met at the determined compliance points.

Air

An evaluation of the air emissions must be made to determine if they present an unacceptable threat to human health and the environment. Three components of the selected remedy emit to the air: 1. the air stripper in the groundwater treatment system if required for pretreatment 2. the vapor extraction system and 3. the explosive gas venting system. These three sources must be considered in combination and the potential human impacts from the total air emissions from the site evaluated. As with the groundwater cleanup standard, air emissions must not exceed a 1×10^{-6} excess lifetime cancer risk level or a chronic hazard index (HI) of 1 at the nearest receptor. BAT or other Ohio standards must be met.

In accordance with the Ohio Administrative Code 3745-27-12 Explosive Gas Monitoring for Sanitary Landfills, the methane level at the site will be monitored and if necessary a venting system will be designed and implemented.

Radiation

At another Superfund Site in Region V radon was discovered accumulated on carbon absorbers used in treatment of groundwater. Radon was present at levels that posed a potential threat to human health and the environment. The radon was naturally occurring.

Because of this finding, radon will have to be considered in implementing the selected remedy. For example, soil gas sampling during the pre-design investigation phase must be performed and monitoring of air emissions and carbon used in any treatment process must be performed.

Radon must be factored into the calculations to determine if the cleanup standards for air, described above, are met.

Background

Background levels for inorganics can be found in Appendix J Tables J-1 and J-2 of the RI report. Background levels for organics are considered to be nondetectable.

STATE ACCEPTANCE

The State of Ohio has indicated that it supports the selected remedy for the Miami County Incinerator site. A letter to this effect from the Director of Ohio EPA is expected.

COMMUNITY ACCEPTANCE

Strong community support has been indicated for the remedy proposed by the Business and Industry Environmental Committee (BIEC). Local industries and elected officials strongly supported the Business and Industry Environmental Committees' cleanup proposal presented at the public meeting on April 6, 1989 and also included in an April 11 BIEC evaluation of the BIEC and U.S. EPA proposed plans that was submitted during the public comment period. At the public meeting and in the April 11, 1989 evaluation, the BIEC proposed cleanup included soil vapor extraction treatment for the Liquid Disposal Area. The BIEC proposal dated April 26, 1989 did not include soil vapor extraction for the Liquid Disposal Area. Instead the April 26, 1989 BIEC comments proposed ground water removal and natural attenuation for the area. EPA has selected vapor extraction for this area because of the preference for treatment expressed in SARA.

Because the remedy proposed in the Record of Decision for the overall site, is close to the BIEC proposal, the remedy is expected to be acceptable to the community. A detailed discussion of the BIEC plan is included as part of the Responsiveness Summary.

X. THE SELECTED REMEDY

This site has seven areas of concern. The selected remedial alternative for each of these areas is:

A. South Landfill - closure according to State sanitary landfill requirements. Alternative A3 has been selected. The major components of the selected alternative are:

- Fence landfill area and post warning signs
- Deed notifications/property use restrictions to prohibit use of groundwater and prevent exposure to contaminants
- Ongoing monitoring
- Grade and cap landfill with single barrier cap

B. North Landfill - closure according to State sanitary landfill requirements. Alternative B3 has been selected. The major components of the selected alternative are:

- Fence landfill area and post warning signs
- Deed notification/property use restrictions to prohibit use of groundwater and prevent exposure to contaminants
- Ongoing monitoring
- Grade and cap landfill with single barrier cap

C. Ash Disposal Pit and Ash Pile - remove to North or South Landfill. Alternative C3 or C4 has been selected depending on the need for treatment. The major components of the selected alternative are:

- Excavation and consolidation of ash wastes and contaminated soils onto the North or South Landfill
- Backfill and vegetate excavated areas
- Treatment if required under RCRA

D. Liquid Disposal Area and Groundwater - vapor extraction, groundwater pump and treatment, capping. Alternative D4A which is a modifdication of Alternative D4 has been selected. The major components of the selected alternative are:

- Ongoing monitoring
- Grade and cap site with double barrier cap
- Vacuum extraction of VOCs from waste and soils
- Vapor phase carbon treatment or equivalent, catalytic oxidation or other appropriate treatment of the exhaust
- Pump and treat contaminated groundwater with discharge to Troy POTW with pretreatment, if necessary
- Continue connection of residential and commercial groundwater users to a potable water supply

E. Former Scrubber Wastewater Lagoon Test soils/ash for complete CLP organic/inorganic parameters including cyanide compounds. An evaluation will then be conducted to determine if any further actions are required. The same type of evaluation as conducted in the Endangerment Assessment (EA) for other site areas will be conducted. If required, the contaminated material would be removed, treated if necessary and placed in the North Landfill. Cleanup, if necessary, would be to background levels of lead and any other contaminants of concern which are identified.

F. Stained Soil Area - no action. This area has a low level of some contaminants but the risks associated with these contaminants do not warrant further action.

G. Eldean Tributary Testing of sediments will be conducted to determine the source of contaminants in the area. Samples will be analyzed for base-neutral compounds, pesticides, PCBs and cyanide. An evaluation will then be conducted to determine if any further actions are required. The same type of evaluation as conducted in the Endangerment Assessment (EA) for other site areas will be conducted. Results will be compared to standards and criteria to see if there would be an effect on the aquatic community. Cleanup of this area, if necessary, would be to a hazard index of less than one for non-carcinogens and to a 10^{-6} total lifetime risk level for carcinogens via direct contact. Cleanup would also be protective of the aquatic community.

H. Groundwater Users - connection to City of Troy water supply. Because of the contamination of residential wells by organic chemicals, these residences are being connected to the City of Troy water supply with the consent of the well owners. The wells with higher levels of contaminants belonging to residences and business in the area have been taken out of service because of the acute threat involved. The remaining residences have water which poses a chronic health threat that is clearly unacceptable over the longer term. Once these residences are connected to city water, the wells should be closed to prevent their use and possible cross contamination of the city water supply. New wells should not be drilled until the aquifer has been cleaned up and the groundwater can be considered safe for human consumption. The length of time this will take cannot now be estimated but it can be anticipated that it will take many years.

XI. STATUTORY DETERMINATIONS

A. Protection of Human Health and the Environment

This remedy will eliminate the exposure to contaminants by the groundwater users downgradient from the site waste areas. Residents and businesses which were using groundwater from the contaminated aquifers will be connected to the city of Troy water supply. Vapor extraction of the liquid disposal area, pumping and treating the groundwater and capping the north and south landfills and liquid disposal area will serve to cleanup the contaminated aquifers. These actions will also serve to eliminate the discharge of contaminants to the Great Miami River.

The deed notification/property use restrictions will prevent a development of the site and possible use of groundwater beneath the site. These restrictions will also prevent the potential exposure of future site users to contaminants in soils which could occur during development of the site.

Fencing and capping the north and south landfills and the liquid disposal area and removing the ash to the north landfill will prevent exposure both to trespassers and wildlife through direct contact with surface contaminants.

B. The remedy will attain all applicable or relevant and appropriate Federal and State requirements (ARARs). ARARs specific to the selected alternatives are discussed in greater detail in the Summary of Comparative Analysis of Alternatives section. Other ARARs for this site are:

Law, Regulation or Standard	Source of Law/Regulation
FEDERAL	
Clean Water Act	CWA Section 301(b)(2)

The treatment of extracted groundwater prior to discharge to publicly owner treatment works is regulated by Section 301(b)(2) which requires the application of Best Available Technology (BAT) economically feasible. BAT is determined on a case-by-case basis pursuant to Section 402(a)(1) of the Clean Water Act using guidelines in 40 CFR 125.3

Resource Conservation and Recovery Act	40 CFR Subpart G

RCRA Section 265.310, Subpart N, specifies the performance based standards for cover at final landfill closure.

After closure is completed, the substantive monitoring and maintenance post-closure requirements contained in Section 265.117 through 265.120 of Subpart G will be conducted.

Safe Drinking Water Act	Safe Drinking Water Act, 40 CFR 141 through 143

The SDWA and corresponding State standards specify maximum contaminant (MCLs) for drinking water at public water supplies. Contaminants for which MCLs are specified must, at a minimum, achieve MCLs.

Intergovernment National Pollutant Discharge Elimination System (NPDES) Permit	CWA Section 402, 40 CFR 122, 123, 125 Subchapter N

Law, Regulation or Standard	Source of Law/Regulation
Pretreatment Regulations for Existing and New Sources of Pollution	40 CFR 403 Subchapter N, FWPCA

Pretreatment of extracted groundwater to control discharge of toxic pollutants to municipal treatment system.

Occupational Safety and Health Act (OSHA)	29 CFR 1910

The selected remedial action contractor must develop and implement a health and safety program for its workers if such a program does not already exist. All on-site workers must meet the minimum training and medical monitoring requirements outlined in 29 CFR 1910.

CLEAN AIR ACT

The Clean Air Act identifies and regulates pollutants that could be released during earth-moving activities associated with regrading and cap installation. CAA Section 109 outlines the criterial pollutants for which National Ambient Air Quality Standards have been established.

RCRA Guidance Document Landfill Design Liner Systems and Final Cover.

STATE

Ohio NPDES Permit	OAC 3745-31-05
Ohio NPDES Regulations	Ohio Administrative Code: 3745-33-01 through 3745-33-10. Authority granted by Ohio Water Pollution Control Act, ORC 6111.03. ORC 6111.042
Ohio Permit to Install New Sources	OAC 3745-31-02
Ohio Water Quality Standards	Ohio Administrative Code: 3745-1. Authority granted by Ohio Water Pollution Control Act, ORC 6111.041.

Law, Regulation or Standard	Source of Law/Regulation
Ohio Pretreatment Regulations	Ohio Administrative Code: 3745-3. Authority granted by Ohio Water Pollution Control Act, ORC 6111.03.
Ohio Water Pollution Control Act	Ohio Revised Code: 6111.01 to 6111.08.
Ohio General and Miscellaneous Air Pollution Regulations	Ohio Administrative Code: 3745-15-04.
	Ohio Administrative Code: 3745-15-07.
	Ohio Administrative Code: 3745-15-08.
Ohio Air Pollution Control Laws	Ohio Revised Code: 3704.03
Ohio regulation on Air Permits to Operate and Variances	Ohio Administrative Code: 3745-35
Nuisance prevention	Ohio Revised Code: 3767
Pollution of "Waters of the State"	Ohio Revised Code: 6111.04
Explosive Gas Monitoring for Sanitary Landfills	Ohio Administrative Code: 3745-27-12

In addition to these promulgated regulations certain state policy and proposed regulations outlined below are to be considered:

Draft State Regulations Final Closure of Sanitary Landfill Facilities	OAC 3745-27-11

Expected to be fully promulgated by October 1989.
Sets forth minimum design standards for sanitary landfill closure.

State landfill design standard widely applied regarding 1 x 10^{-7} cm/s soil permeability of single barrier 24" compacted - clay cap.

C. Cost Effectiveness

The selected remedy for the north and south landfill and the ash pile and pit once the ash has been placed in the north landfill is prescribed by compliance with State solid waste landfill closure ARARs. The range of alternative actions to meet closure requirements is very limited. Therefore, the selected alternatives are essentially cost-effective because it is the least expensive alternative which satisfies said regulations.

The selection of vapor extraction for the liquid disposal area is deemed cost effective since it is one of two remedies which could be effectively used for this area. The other alternative is incineration of the material. This would cost six to seven times as much without producing a proportionate benefit. Incineration would leave a residue which would need to be disposed of on site or taken to an appropriate landfill offsite.

The pumping and treating of the groundwater is the only viable alternative to deal effectively with this contamination problem. It is therefore, cost-effective by definition. This is the standard method for groundwater cleanup and is widely applied at Superfund sites.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The alternatives selected were determined to be the most appropriate ones for each area of the site where they are being utilized. The liquid disposal area and the groundwater required alternatives which were compatible with both areas. Vapor extraction, groundwater pumping and treating and capping will provide a permanent remedy for the areas. They also exhibit a preference for treatment as a principal element of the remedy.

A permanent remedy involving treatment or recovery technologies was not selected for the landfill areas. Permanent remedies involving treatment or incineration were evaluated and were judged to be not practicable for the site.

Application of treatment and incineration technologies would be impracticable for the following reasons:

- Hazardous substances were apparently placed haphazardly within the landfill waste mass during operation. Segregation of hazardous from non-hazardous waste would be impractical. Therefore, treatment would be required for the entire waste mass. This was considered: 1) not technically practicable, 2) not prudent because of the potentially greater risk to human health and environment caused by excavation.

- The estimated cost of thermal treatment would be extremely high and require many years to complete.
- Full ARAR compliance would be achieved by landfill closure which would be protective of human health and cost effective.

APPENDIX A

OhioEPA

State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

Richard F. Celeste
Governor

July 5, 1989

Mr. Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V
230 S. Dearborn Street
Chicago IL 60604

Dear Mr. Adamkus:

In response to your June 30, 1989 letter the Ohio Environmental Protection Agency (Ohio EPA) has reviewed the draft Record of Decision for the Miami County Incinerator site in Troy, Ohio.

Ohio EPA concurs with the selected remedial action presented in the June 21, 1989 ROD, with modifications discussed June 27 and 28 between the Region's Remedial Project Manager and Ohio EPA's Project Coordinator.

If you have any questions or concerns regarding this issue, feel free to call me.

Sincerely,

Richard L. Shank

Richard L. Shank, Ph.D.
Director

RLS/KAD/lz

cc: Mike Starkey, SWDO
Jenny Tiell, DCA
Dave Strayer, DCA
Katherine Davidson, DCA
Tony Rutter, U.S. EPA
Craig Liska, U.S. EPA

RESPONSIVENESS SUMMARY

MIAMI COUNTY INCINERATOR SITE
Troy, Ohio

U.S. EPA

June 29, 1989

INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) with the Ohio Environmental Protection Agency, has completed a Remedial Investigation and Feasibility Study (RI/FS) for the Miami County Incinerator Site at 2200 North County Highway 25-A, Troy, Ohio. During the RI, information was gathered on the nature and extent of contamination: as part of the FS, alternatives for remedial action were developed and evaluated. At the conclusion of the FS, the U.S. EPA prepared a Proposed Plan that identified recommended alternatives for remedial action at the site. At a public meeting on April 6, 1989, the U.S. EPA presented the findings of the RI/FS and issued its Proposed Plan.

This Responsiveness Summary addresses the comments received during the recent public comment period, presents U.S. EPA's response to the comments, and describes how they were incorporated into the decisionmaking process. All comments received from the public were considered before the U.S. EPA selected its final remedy for the site.

The Responsiveness Summary is divided into three sections:

- **Overview**--outlines the proposed remedial alternatives presented in the FS and at the public meeting.
- **Background on Community Involvement**--provides a brief history of community interest and of concerns raised during the planning activities.
- **Summary of Public Comments**--presents both oral and written comments and the U.S. EPA's responses to them.

OVERVIEW

On March 26, 1989, the U.S. EPA released the Miami County Incinerator Site Final Remedial Investigation and Public Comment Feasibility Study reports to the public for review. The public comment period ended on April 26. During the FS, remedial action alternatives were developed and evaluated for the South Landfill, the North Landfill, the Ash Pile and Ash Disposal Pit, and the Liquid Disposal Area and Groundwater. The array of alternatives considered are presented in Table 1 and described in detail in the FS report.

After careful consideration, the EPA issued its recommended remedial alternative, as identified in its Proposed Plan, consisting of:

OPERABLE UNIT AND ALTERNATIVES / GENERAL RESPOSE ACTIONS AND TECHNOLOGIES	CONTAINMENT			REMOVAL		TREATMENT					DISPOSAL	
	COMPACTED SOIL COVER	SINGLE BARRIER CAP	DOUBLE BARRIER CAP	EXCAVATION	GROUNDWATER EXTRACTION	STABILIZATION / FIXATION	VAPOR EXTRACTION	AIR STRIPPING	VAPOR PHASE CARBON ADSORPTION	INCINERATION	ONSITE CONSOLIDATION	SURFACE WATER DISCHARGE
SOUTH LANDFILL												
A1 NO ACTION												
A2 SOIL COVER	✓											
A3 SINGLE BARRIER CAP		✓										
NORTH LANDFILL												
B1 NO ACTION												
B2 SOIL COVER	✓											
B3 SINGLE BARRIER CAP		✓										
B4 DOUBLE BARRIER CAP			✓									
ASH PILE AND ASH DISPOSAL PIT												
C1 NO ACTION												
C2 SINGLE BARRIER CAP		✓										
C3 CONSOLIDATION WITHOUT TREATMENT			✓	✓							✓	
C4 CONSOLIDATION WITH TREATMENT			✓	✓		✓					✓	
LIQUID DISPOSAL AREA AND GROUNDWATER												
D1 NO ACTION												
D2 CAP WITH NATURAL GROUNDWATER ATTENUATION			✓									
D3 DOUBLE BARRIER CAP WITH GROUNDWATER TREATMENT			✓		✓			✓	✓			✓
D4 VAPOR EXTRACTION AND CAP WITH GROUNDWATER TREATMENT			✓		✓		✓	✓	✓			✓
D5 INCINERATION WITH GROUNDWATER TREATMENT			✓	✓	✓			✓	✓	✓	✓	✓

GLO65558 PS1 SUMMARY OF ALTS 6/19/89

LEGEND

✓ TECHNOLOGY TO BE IMPLEMENTED

NOTE:
Refer to Chapter 4 of the Feasibility Study Report for descriptions of requirements common to all alternatives such as institutional actions, flood control, and groundwater monitoring

TABLE 1
SUMMARY OF ALTERNATIVES
MIAMI COUNTY INCINERATOR
RESPONSIVENESS SUMMARY

- A single-barrier cap for the South Landfill
- A double-barrier cap for the North Landfill
- Consolidation with treatment, if necessary, of the contents of the Ash Pile and Ash Disposal Pit (subject to the Land Disposal Restrictions of RCRA)
- Vapor extraction, groundwater pumping and treatment, and capping for the Liquid Disposal Area and Groundwater
- Access restrictions, groundwater monitoring, and alternative water supply

Numerous oral and written comments on the Proposed Plan and the RI and FS reports were submitted to the U.S. EPA during the public comment period. Comments were received from:

- Thirty-seven area residents, businesses, and industries
- Sixteen local governmental agencies
- The Ohio EPA
- The Business and Industry Environmental Committee (BIEC) representing a group of potentially responsible parties (PRPs)

Many of the public comments acknowledge similarities in the U.S. EPA recommended alternatives and those submitted by BIEC during the public comment period. Others expressed support for the BIEC plan because it is perceived to be more cost-effective and to encourage local involvement. After consideration of the BIEC plan and other public comments, the proposed alternative was modified and presented in the Record of Decision (ROD) as the selected remedial action.

BACKGROUND ON COMMUNITY INVOLVEMENT

A Community Relations Plan for the incinerator site was prepared in September 1984. As part of the plan, a mailing list of all interested persons was developed early in the RI. The list includes about 100 names. To date, four fact sheets have been distributed to the community to advise local citizens of the Superfund activities at the site. The fact sheets summarize site activities, findings, and future plans.

A public meeting was held in Troy, on September 10, 1986, to discuss the first phase of the RI. A second public meeting was held on April 6, 1989. The final RI report, the endangerment assessment, the FS report, and the Proposed Plan were discussed at the meeting followed by a question and answer session. These documents are included in the Administrative Record, and were available for review at the Miami County Public Library and at the Miami County Commissioner's Office.

The public comment period lasted from March 27 to April 26. Comments were accepted by mail and at the public meeting. All comments were considered when the ROD was prepared.

The BIEC represents businesses, industries, and county and city governments in Miami County. It was formed in 1984 when the incinerator site was placed on the National Priorities List (NPL). The purpose of the committee is to coordinate a privately funded, cost-effective response to the cleanup at the site.

SUMMARY OF PUBLIC COMMENTS

Comments received during the Miami County Public Comment period have been organized and paraphrased to facilitate U.S. EPA response. The actual comments are retained in the Administrative Record available for public inspection from the U.S. EPA Region V in Chicago.

COMMENTS FROM THE BIEC

Comments prepared by the BIEC were received in the form of two documents: the first dated April 11 and the second on April 26. The U.S. EPA has decided to address the earlier document only briefly, since many of these comments are the same as those from the later report titled *Comments on RI/FS and Proposed Remedial Plan, Miami County Incinerator Site, Miami County, Ohio*. The EPA responses to the report are organized to follow the organization, section headings, and page numbers of the BIEC report.

BIEC's Cover Letter to U.S. EPA dated April 26, 1989

1. Comment, page 2, paragraph 2: Over 99 percent of the waste disposed of at the incinerator site can be characterized as municipal waste.

   U.S. EPA Response: The EPA agrees that the facility was operated as a municipal landfill but does not concur that 99 percent of the waste is municipal (residential and commercial) in nature. The Miami County monthly waste tonnage records and ledgers identify daily amounts of "residential" and "industrial" wastes received. A preliminary review of those records indicates that approximately 30 percent (by weight) of the monthly wastes received was classified as industrial tonnage. However, the reported tonnage and types of wastes are of little consequence when considering the analytical findings of the RI. The data indicate that many hazardous substances are present in the subsurface soil and wastes in the Liquid Disposal Area and in the groundwater downgradient from that area.

2. Comment, page 2, paragraph 3: Liquids were disposed of for only 1 year and "in the RI/FS, U.S. EPA's consultant stated that over 30,000 gallons of hazardous waste were disposed of at the site on a weekly basis." This figure is "a gross exaggeration of the volume. . . . To rely on that wholly inaccurate estimate of liquid wastes disposed of at the site in light of known facts, would be irresponsible, arbitrary, and capricious."

The EPA did not base the remedy on the reported volume estimate of liquid waste disposal at the site as suggested by the reviewer but upon the degree of contamination and the public health and environmental risks posed by the contamination documented in the RI report.

U.S. EPA Response: The estimate of 30,000 gallons of industrial liquid waste per week is from a statement signed on October 31, 1973 by Donald Hiser, who was the Miami County Sanitarian. The commentor is incorrect in claiming that both the RI and the FS reports state that "30,000 gallons of hazardous waste" were disposed of at the site Mr. Hiser's memorandum is cited in both reports along with the statement that "it was estimated that nearly 30,000 gallons of liquid waste, primarily waste ail, were being accepted weekly." The EPA did not base the remedy on the reported volume estimate of liquid waste disposal at the site as suggested by the reviewer but upon the degree of contamination and the public health and environmental risks posed by the contamination documented in the RI report.

The EPA acknowledges Mr. Brookhart's affidavit signed in April 1989 stating that liquids were accepted at the site for 1 year in the early 1970s, but the EPA has information refuting that claim. The data base and Liquid Waste Report prepared by Techlaw/Resource Application, Inc. and based on a review of 87,000 weight tickets indicates that liquid waste transactions were reported over several years. BIEC has access to that data base. In addition, statements from those who have disposed of waste at the site gathered under the provisions of Section 104(e) of CERCLA indicate liquid wastes were disposed of at the site as late as 1977.

3. Comment, page 2, paragraph 4: There is a probability that there are offsite sources of groundwater contamination that should have been investigated.

U.S. EPA Response: The EPA believes the groundwater contamination documented in the RI report is the result of disposal practices at the site. The area of contamination is hydraulically downgradient of the site, a large plume of contamination consistently occurs between the site and the farthest limits of contamination, and the specific contaminants are generally consistent within the plume. It is not known, but possible that offsite sources of contamination may exist.

4. Comment, page 2, paragraph 5: There is serious doubt that the site should have been listed on the NPL.

U.S. EPA Response: The RI report and endangerment assessment sufficiently documented threats to the public health and environment from contaminants present at the site. The field sampling and analysis conducted during the RI/FS substantiate the Hazard Ranking System scoring and NPL listing.

5. Comment, page 2, paragraph 6: BIEC has submitted a remedial plan that it believes is superior to the U.S. EPA's preferred remedy.

U.S. EPA Response: While many of the BIEC suggestions merit consideration, the EPA has found deficiencies in the BIEC proposed plan that are identified in responses to the specific BIEC proposed actions.

6. Comment, page 2, paragraph 7: BIEC states that its proposal is based on analytical data that is "not assailable," whereas the U.S. EPA's "preferred remedy is based on inaccurate information which leads to selection of unnecessary technologies that . . . could cause uncontrolled landfill fires."

U.S. EPA Response: To the EPA's knowledge, BIEC had not collected analytical data independent of the EPA's RI. In fact, BIEC and U.S. EPA used identical analytical data presented in the RI report in developing their respective remedial actions. It is not clear how BIEC's data are "unassailable" and EPA's are. The EPA acknowledges the concern about landfill fires but believes that proper implementation of the soil vapor extraction system (based on results of onsite pilot tests) could greatly reduce the possibility of landfill fires.

7. Comment, page 2, paragraph 8: BIEC proposes that groundwater be treated at the City of Troy POTW.

U.S. EPA Response: Discharge to the City of Troy POTW was considered a potential treatment option (FS report, p. 3-20). The U.S. EPA considers it a viable treatment option.

8. Comment, page 3, paragraph 2: BIEC's proposed plan is more consistent with the requirements of CERCLA, the NCP, and federal and state regulations than the U.S. EPA's.

   U.S. EPA Response: The EPA disagrees. The EPA's Proposed Plan meets all federal and state Applicable or Relevant and Appropriate Requirements (ARARs). The BIEC plan does not meet all ARARs. Specifics on which ARARs are not met by the BIEC plan are discussed in subsequent responses.

9. Comment, page 3, paragraph 3: The BIEC plan is more cost-effective while providing the same level of protection to public health and the environment.

   EPA Response: The U.S. EPA believes the BIEC plan provides a lower level of protection and fails to meet specific ARARs.

10. Comment, page 3, paragraph 5: Ownership of the site by Miami County would provide a continuous ability by a responsible party to respond to inadequacies in the remedy.

    U.S. EPA Response: The EPA will continue to evaluate the adequacy of the remedy during and after implementation and will pursue all responsible parties either to implement necessary changes or to pay all cost incurred by the EPA in implementing any necessary changes, regardless of who owns the site.

11. Comment, page 3, paragraphs 6 and 7: The BIEC plan will result in a faster cleanup of the site. BIEC requests that the U.S. EPA adopt BIEC's proposed plan.

    U.S. EPA Response: The length of cleanup is a function of the ability of the designed system to achieve agreed upon goals. The EPA does not accept the BIEC plan as providing sufficient protection of human health or the environment or meeting all ARARS. The EPA feels it was premature for BIEC to make such predictions.

Section 1.0--Introduction

1. Comment, page 2, paragraph 2, sentence 3: The Miami County Incinerator site was established primarily for municipal refuse.

   U.S. EPA Response: The EPA agrees with this statement but notes that the facility was established for the disposal of solid wastes, including byproducts of industry or commerce in addition to residential waste (Board of Commissioners of Miami County 1968). In 1970, the Miami County Sanitary Engineer estimated that about 70 tons/day (45 percent) daily waste received was industrial, 53 tons/day (35 percent) municipal, and 30 tons/day (20 percent) nonmunicipal (Brookhart 1970).

2. Comment, page 2, paragraph 2, sentence 3: Liquid wastes were accepted by the facility for approximately 1 year (1973-74) and disposed of in a Liquid Disposal Area.

   U.S. EPA Response: See response to Comment 2 in the previous section.

3. Comment, page 3, paragraph 2, sentence 1: On March 27, 1989, the RI/FS reports were made available for public comment.

   U.S. EPA Response: Although above comment is accurate, the EPA provided BIEC with draft copies of the RI report in July 1988 and the FS report before the beginning of the public comment period.

4. Comment, page 3, paragraph 1: Citizens representing various businesses, governments, and civic groups made comments at the public meeting in April. They "unanimously" supported the BIEC plan over the EPA's.

   U.S. EPA Response: There is some question as to which BIEC plan was endorsed at the public meeting. In a written comment (dated April 25, 1989) supporting the BIEC plan, American Plasma Tech included as an attachment the BIEC proposed plan titled "Miami County Incinerator Site Joint Cleanup Proposed by Miami County, City of Troy, City of Piqua, Tipp City, and Business and Industry Committee for Miami County." The BIEC proposal included a cover letter dated April 11, 1989, soliciting assistance from local industries and businesses in making public comments in support of the joint cleanup plan. That plan appears to be an earlier version of the BIEC plan submitted to the EPA on April 25, 1989. Although the two plans are similar in many respects, the first plan includes soil vapor extraction treatment for the Liquid Disposal Area. Thus, other persons submitting written or verbal support for the BIEC plan may have been referring to the April 11 BIEC plan, which included vapor extraction for the Liquid Disposal Area.

5. Comment, page 4, paragraph 3: The BIEC plan is consistent with the requirements of CERCLA and the NCP, is as protective of public health and the environment as the U.S. EPA's proposed remedy, provides a more beneficial use of the site, and is more cost-effective.

   U.S. EPA Response: The EPA disagrees. See responses to Comments 8, 9, and 11 in the previous section regarding BIEC's letter to U.S. EPA.

Section 2.0--General Discussion

1. Comment, page 5, paragraph 1, section 1: The most important fact to be considered in developing a remedial action plan is that more than 99 percent of waste disposed in the two landfills was municipal waste.

   U.S. EPA Response: The EPA disagrees. The threat to public health and environment documented in the endangerment assessment is more important. The EPA also disagrees with BIEC's estimate that the wastes are 99 percent municipal. The EPA's review of site records indicates about 30 percent of waste received was industrial waste. See response to comment 1 regarding the BIEC letter of April 26, 1989.

2. Comment, page 5, paragraph 1, sentence 5: The EPA had access to all waste-in documentation but a similar analysis of wastes disposed of at the MCI site was not performed during the RI/FS.

   U.S. EPA Response: The EPA has performed a detailed examination of 87,000 weight tickets from MCI, including an evaluation of waste types. However, records describing the type of materials that were disposed of were not consistently maintained. The EPA has not performed a similar evaluation of the additional 128,000 weight tickets obtained and held by the BIEC to avoid unnecessary expenses. As mentioned, the weight ticket documentation is incidental to the analytical data gathered during the RI.

3. Comment, page 5, paragraph 2: The statement in the FS report that hazardous wastes were probably disposed of in the North Landfill is not supported.

   U.S. EPA Response: The EPA believes that hazardous substances were more likely to be disposed of in the North Landfill than in the South Landfill because the Liquid Disposal Area is within the North Landfill and because of the uncertainty associated with identifying the areal extent of the Liquid Disposal Area.

4. Comment, page 5, paragraph 3: BIEC believes the estimate of 30,000 gallons of liquid waste received weekly at the site and the estimate of total quantity of liquid waste between 104,000 to 150,000 barrel equivalents to be incorrect and misleading.

   U.S. EPA Response: See response to comment 2, BIEC letter of April 26, 1989.

5. Comment, page 6, paragraph 2: If estimates of quantities were correct, the RI would have detected a large pool of oil beneath and downgradient of the Liquid Disposal Area.

   U.S. EPA Response: The EPA agrees that RI results do not support the estimate of 150,000 barrel equivalents being discharged if it is assumed that all was waste oil. However, even using the best available information, it is possible that the full extent of the Liquid Disposal Area was not defined.

6. Comment, page 7, paragraph 1: Discontinuities that may exist in the till east of the site would affect aquifer remediation alternatives.

   U.S. EPA Response: It is correct that discontinuities may exist in the till unit east of the site and that they would effect remediation. However, all stratigraphic data compiled for that area of the site suggest that the till unit is continuous along the eastern boundary of the site.

7. Comment, page 8, paragraph 2: The RI and FS reports do not report pump test drawdown data from piezometers and monitoring wells completed in the upper aquifer. Such data would show the degree of interconnectedness of the upper and lower aquifer east of the site.

   U.S. EPA Response: Data collected from piezometers completed in the upper aquifer and monitored during the pump test did not show measureable head change over the duration of the test. Those data were admittedly not included with RI report but are available for review upon request.

8. Comment, page 8, paragraph 3: Figures 4-10 and 4-12 of the RI have incorrectly drawn groundwater level contours. Water level elevations for monitoring wells CH13B and RW11 as presented in the RI were not taken into account.

U.S. EPA Response: These water level measurements appeared to be outlying data points and were intentionally excluded in preparing the contours on Figures 4-10 and 4-12. Even so, their inclusion would not affect the overall gradients calculated for the lower and upper aquifers.

9. Comment, page 10, paragraph 3: The RI/FS erroneously used isolated zones of contamination to characterize the entire Liquid Disposal Area.

U.S. EPA Response: Test pits were located randomly throughout the suspected Liquid Disposal Area to minimize bias in determining the horizontal extent of contamination. As described in the work plan and the RI and FS reports, vertical sampling was performed in zones of the cross section determined to be more contaminated on the basis of screening. This bias was described in the RI and FS reports. Where data were extrapolated to calculate contaminant mass in the Liquid Disposal Area, the vertical bias was noted and considered in the calculations.

10. Comment, page 11, paragraphs 1 and 2: The U.S. EPA's inclusion of solidification in the remedy for the Ash Disposal Pit and Ash Pile is unjustified because extraction procedure (EP) toxicity tests were not conducted.

U.S. EPA Response: The EPA's Proposed Plan included EP toxicity testing to determine whether the waste is subject to the Land Disposal Restrictions under RCRA and to determine if treatment, such as solidification, is required before consolidating the waste in the North Landfill.

11. Comment, page 13, paragraph 1: Inconsistent scattered values for VOCs suggest that offsite contaminant sources may exist.

U.S. EPA Response: See response to comment 3, BIEC letter of April 26, 1989.

12. Comments, page 13, paragraph 3 and page 14, paragraph 1: The RI did not conform to the guidance in the Superfund Public Health Evaluation Manual. BIEC is concerned with the selection of chemicals of concern. The BIEC appears to be concerned that the RI, instead of evaluating indicator chemicals, evaluated a broader range of chemicals and "that the failure to identify the most significant chemicals did lead to some misleading, if not erroneous conclusions." BIEC specifically states the use of maximum reported concentrations was misleading and, further, that the endangerment assessment followed a worst case analysis.

U.S. EPA Response: The endangerment assessment evaluated a range of risks. One set of risks was based on the highest detected contaminant concentration, but a second set of risks was based on average concentrations. This approach was taken for several reasons. First, no effort can define perfectly the nature and extent of contamination at a site. Consequently, the one time occurrence of a chemical in a sample does not guarantee that the chemical may not appear elsewhere at the site. Because of the uncertainty associated with this effort, it was reasonable to estimate risks for a range of concentrations and to decide upon which risks to base remedial decisions. This approach is consistent with the Superfund Public Health Evaluation Manual. It should be noted that while the highest detected concentrations for all chemicals were used to calculate one set of risk estimates, the second set (based on mean concentrations) had estimated risks for only those chemicals that were detected in 10 percent or more of the samples analyzed.

Chemicals of concern were identified after the risks were estimated. Because antimony was detected in one well does not suggest it is not a chemical of concern. There are several possible sources of contamination at the site. Well CH10B is downgradient from the Ash Pile and the Scrubber Wastewater Lagoon. It is possible that the antimony in the well is related to those sources. Similarly, toluene is not unimportant just because it was found only once at a concentration that exceeded the reference dose (RfD) based limit. The well in which it was found (CH09A) is downgradient from the Liquid Disposal Area. While the EPA agrees that the primary principal contaminants in the groundwater associated with the site are trichloroethene, vinyl chloride, and tetrachloroethene, that does not mean that other contaminants are not important on a localized basis.

13. Comment, page 14, paragraph 3: Arsenic is below its MCL, so it probably should not be included as an indicator chemical.

U.S. EPA Response: The endangerment assessment discussed some of the concerns about risk estimation for arsenic; however, just because any chemical is below its MCL does not exclude it from consideration in an endangerment assessment. MCLs are not strictly risk based and have technical and economic feasibility components in their development; therefore MCLs cannot be used as a risk evaluation criteria by themselves.

14. Comment, page 15, paragraph 3: The endangerment assessment used a "worst case" approach instead of the prescribed conservative approach.

U.S. EPA Response: The endangerment assessment presented a range of risks, including risks based on the highest detected concentrations and risks based on mean concentrations. While it may be debated whether use of highest detected concentrations necessarily reflects worst case conditions, the risks estimated using mean concentrations also indicated that the risks from the site were high enough to consider remedial action.

15. Comment, page 16, paragraph 1: Careful examination of RI groundwater data suggests there are additional sources of groundwater contamination.

    U.S. EPA Response: See response to comment 3, BIEC cover letter of April 26, 1989.

Section 3.0--Operable Unit

1. BIEC added the Scrubber Wastewater Lagoon and Stained Soil Area to the list of operable units.

   U.S. EPA Response: The above modifications are recognized.

Section 4.0--South Landfill

1. Comment, page 19 through page 21: The single-barrier cap of Alternative A3 exceeds the requirements for Ohio Sanitary Landfill Closure (OAC 3745-27-10). BIEC proposes an alternative cap design for 12 inches of clay, 6 inches of sand, 6 inches of fill, and 6 inches of topsoil. BIEC believes its proposal is more cost-effective, results in less infiltration, and meets Ohio requirements.

   U.S. EPA Response: BIEC's proposal does not meet the Ohio requirements (OAC 3745-27-9 and -10) for at least 2 feet of well-compacted cover material having low permeability to water since it includes only 12 inches of compacted clay.

Section 5.0--North Landfill

1. Comment, page 23, paragraph 1: The EPA's selection of a double-barrier cap for the North Landfill is based on speculation that hazardous waste may have been deposited in this area.

   U.S. EPA Response: See response to comment 1, BIEC letter dated April 26, 1989. As stated in the Proposed Plan, a double-barrier cap was recommended for the North Landfill because it is difficult to determine whether contaminants detected in the groundwater downgradient from the North Landfill originate solely from the Liquid Disposal Area or other areas of the North Landfill, and the possibility of future release of contaminants from the landfill to groundwater cannot be ruled out. After consideration of public comments and upon further examination of state and federal regulations, the EPA has determined that a single-barrier cap as described in the ROD is sufficient.

2. Comment, page 23, paragraph 2: RI groundwater data indicate virtually all the waste placed in the North Landfill is municipal.

   U.S. EPA Response: Groundwater data cannot be used to determine whether hazardous wastes were disposed of in the North Landfill. Less mobile hazardous substances or wastes contained in drums would not necessarily have reached monitoring wells downgradient of the North Landfill.

3. Comment, page 23, paragraph 2: Data collected during the RI illustrate that groundwater quality downgradient of the Liquid Disposal Area is distinctly different from that downgradient of the North Landfill. The RI data also show that groundwater quality downgradient of the North Landfill is very similar to groundwater quality downgradient of the South Landfill.

   U.S. EPA Response: The RI data have been misinterpreted. BIEC has based its conclusions on data for one well downgradient of the southern end of the North Landfill (Well CH08B). It is not sufficient to make such a definitive statement based on the limited data available and recognizing the complexity of the hydrogeologic conditions at the site. For instance, the quantity and number of VOCs detected in May 1985 from the incinerator well (RW11), which is about 200 feet directly downgradient from the North Landfill, do not support BIEC's conclusions.

4. Comment, pages 24 to 26: The single-barrier cap proposed by BIEC would satisfy the design requirements for final closure of existing hazardous waste landfills, and there is no justification to attempt to eliminate all infiltration.

   U.S. EPA Response: The EPA recognizes that a single-barrier cap could meet the minimum requirements of 40 CFR 265.310 for final closure. However, the cap configuration proposed by BIEC does not meet the state regulation for landfill closure, which requires 2 feet of a well compacted, low permeability cover material (OAC 3745-27-9 and -10).

5. Comment, page 27, paragraph 3: The use of high density polyethylene synthetic liner in a double-barrier cap is technically inappropriate for the North Landfill because of potential for differential settlement.

U.S. EPA Response: The EPA recognizes the potential for ripping of synthetic liners placed over sanitary landfills. However, the potential for differential settlement sufficient to cause tearing in the liner is not great for the North Landfill. The shallow depth of fill (about 17 feet) and the age of the landfill are two factors that support the EPA's position that excessive settlement is not expected.

Section 6.0--Ash Disposal Pit and Ash Pile

1. Comment, page 29, paragraph 1: The volume of ash is about 12,000 cubic yards rather than the 20,000 cubic yards used in the RI and FS.

   U.S. EPA Response: The volume of ash determined in the RI/FS is an estimate. The actual volume of ash to be removed will be determined through sampling during design and construction.

2. Comment, page 29, paragraph 3: No data were collected during the RI that indicate the materials have released or will release hazardous substances in concentrations that will affect the environment adversely.

   U.S. EPA Response: Impacts on the environment do not require quantification if risks to public health sufficient to require remediation are documented. This is the case for the Ash Pit and the Ash Pile.

3. Comment, page 30, paragraph 3: No data were collected during the RI to determine if solidification/fixation would reduce the rate of contaminant release.

   U.S. EPA Response: See response to comment 10, Section 2.0.

4. Comment, page 32, paragraph 2: Construction of a new solid waste transfer station at the site would be beneficial to the county.

   U.S. EPA Response: Refer to the response to comment 10, BIEC letter of April 26, 1989.

5. Comment, page 33, paragraph 4 and page 34: BIEC's proposed remedy for the Ash Pile is excavation and consolidation of its contents under the North Landfill cap. Leachate extraction testing would be done to demonstrate that the ash is suitable for disposal without solidification. Even if the waste is a characteristic hazardous waste (fails EP toxicity testing), disposal would be done prior to May 1990, and solidification would not be done.

U.S. EPA Response: Solidification of the Ash Pile contents would be necessary only if its contents fail EP toxicity tests. If excavation is performed before land disposal restriction requirements for solidification are imposed, disposal beneath the landfill cap without solidification would be considered if the pile contents pass EP toxicity testing.

Section 7.0--Scrubber Wastewater Lagoon and Visibly Stained Soils

1. Comment, page 35, paragraph 1: BIEC proposes to investigate the Scrubber Wastewater Lagoon to determine whether residuals that require remediation are present. If necessary, remediation would consist of excavating and consolidation in the North Landfill.

   U.S. EPA Response: The EPA notes that BIEC agrees on the need for investigating the lagoon area for residuals as stated in EPA's Proposed Plan. The need for treatment before consolidation will be determined as part of the design investigation.

2. Comment, page 35, paragraph 3: BIEC proposes to excavate the Stained Soil Area and remove its contents to the North Landfill for aesthetic reasons.

   U.S. EPA Response: The EPA will not object if BIEC elects to remove the Stained Soil Area for aesthetic reasons.

3. Comment, Table 6: Current regulations for municipal incinerator fly ash do not require solidification for landfilling.

   U.S. EPA Response: BIEC's comment is correct but irrelevant. See the response to comment 10 Section 2.0.

Section 8.0--Liquid Disposal Area

1. Comment, page 36, paragraph 1: BIEC notes that according to the RI report perched groundwater is present below the waste materials and that traces of waste oils were observed in the perched groundwater.

   U.S. EPA Response: It appears the information in the RI report has been misinterpreted. Perched groundwater was observed within the waste materials at one location, possibly two. The water table was encountered at several locations, particularly in the eastern portions of the Liquid Disposal Area. Refuse was observed below the water table at several locations. Data collected during the RI indicated a slight but measurable layer of waste oils on water samples collected at the water table and not a trace in the perched groundwater as stated by BIEC.

2. Comment, page 36, paragraph 2: BIEC states that the FS report identified four alternatives for the Liquid Disposal Area.

   U.S. EPA Response: It appears the information in the FS report has been misinterpreted. The FS identified five alternatives for the Liquid Disposal Area. In addition to the four listed by BIEC, incineration with groundwater treatment was identified as a fifth alternative.

3. Comment, page 37, paragraph 2: BIEC lists a number of items that it states are components of the EPA's remedy associated with dewatering and vapor extraction for the Liquid Disposal Area.

   U.S. EPA Response: The purpose of the FS was to develop feasible alternatives for remediating the release or threat of release of contaminants at the site and to develop order-of-magnitude cost estimates for those alternatives. To achieve that objective it was necessary to make some assumptions. The selected alternative will be further developed during predesign and design to determine appropriate materials, quantities, and other design criteria. The items BIEC listed are simply assumptions used to develop order-of-magnitude cost estimates in the FS and are not presented as components of the vapor extraction design.

4. Comment, page 37, paragraph 3: BIEC states the EPA proposed remedy is inappropriate, did not adequately evaluate the RI data, and did not address implementation problems.

   U.S. EPA Response: Vapor extraction is an appropriate, proven technology for reducing concentrations of VOCs in the unsaturated zone of the waste materials. As mandated by SARA, it is the EPA's intention to reduce the toxicity and volume of contaminants in the Liquid Disposal Area through treatment. It is the EPA's determination that vapor extraction will help achieve that goal.

   The EPA maintains that the RI data were adequately evaluated in the FS process. The FS report acknowledged the problems associated with installing a soil vapor extraction in municipal refuse. Both the FS report and the Proposed Plan acknowledge the need for predesign pilot testing of a vapor extraction system to address those concerns. This step will be necessary before an effective vapor extraction system can be designed and implemented.

5. Comment: page 37, paragraph 4: BIEC claims that the quantity of VOCs in the unsaturated zone is too high.

U.S. EPA Response: Alternative D4 includes dewatering wells to lower the water table beneath the Liquid Disposal Area. This allows the vapor extraction system to remove VOCs in the existing unsaturated zone as well as those adsorbed on the aquifer matrix. As a result, the estimate of VOC mass removed included samples from the unsaturated zone and the zone to be dewatered. The removal of one pore volume during dewatering will remove a portion of the contaminant mass adsorbed on the aquifer matrix, but much of the mass will likely remain. EPA also notes that actual VOC mass removed may be substantially more than estimates based on laboratory analysis of soil samples.

6. Comment, page 39, paragraph 1: The FS did not adequately address the required dewatering system, nor did it consider the time required to achieve drawdown of 10 feet with the proposed pumping rates. To achieve this drawdown in a reasonable time (60 days), the six wells would have to be pumped at a combined rate of 150 to 180 gpm.

U.S. EPA Response: In calculation of drawdown and time required to achieve it, the BIEC used the site average hydraulic conductivity for the upper aquifer of 9.7 x 10^{3} cm/s instead of the value measured at monitoring well CH09 (1.07 x 10^{-3} cm/s), which is located nearest the Liquid Disposal Area. This is a difference of nearly one order of magnitude. While it is acknowledged that it will take approximately 1 year to develop the cone of depression depicted in Figure D-3 of the FS report, it should also be noted that suitable dewatering to begin vapor extraction is estimated to be accomplished within 30 days. Using the value of hydraulic conductivity measured at CH09, a drawdown of approximately 9 feet can be accomplished in approximately 30 days, at a distance of 100 feet from the pumping center. This distance encompasses the entire Liquid Disposal Area.

7. Comment, page 39, paragraph 2: BIEC states the EPA proposed vapor extraction rate of 3,000 cfm does not take the landfill contents into account and that it would probably turn the interior of the landfill from an anaerobic to an aerobic environment resulting in the risk of a landfill fire.

U.S. EPA Response: The EPA did not propose a vapor extraction rate of 3,000 cfm. That blower rate was used only to develop the order-of-magnitude cost estimate. As stated in the FS report, the vapor extraction rate will be determined during pilot testing. It will take into consideration the effect on microbial activity and waste temperatures.

8. Comments, page 40, Items ii and iii: BIEC refutes the EPA's alleged proposed design of the vapor extraction system. They state that vapor extraction could be accomplished with fewer extraction wells, and should be operated at lower VOC removal rates, thereby increasing the operating time.

   U.S. EPA Response: The quantities stated in the FS report were only for the purpose of estimating costs and were not intended as design elements. Quantities, materials, and configuration of the vapor extraction system and the monitoring system must be developed during design based on results of pilot testing. The period of operation will be reevaluated based on pilot tests and would be a factor in determining the effectiveness of vapor extraction.

9. Comment, page 40, paragraph 4: BIEC states that its proposed alternative remedy of soil flushing and groundwater capture would effectively remove VOCs from the Liquid Disposal Area.

   U.S. EPA Response: Because of the lack of information presented in the BIEC proposal with respect to a soil flushing system, it is the EPA's opinion that BIEC fails to substantiate its point. The BIEC plan refers to a passive soil flushing system consisting of percolation through the single-barrier cap and subsequent collection through the groundwater extraction system. This passive soil flushing system is not an acceptable treatment alternative. Vapor extraction with pilot testing was selected in the ROD; however, if the pilot test is not successful, active soil flushing would be an acceptable treatment alternative for the Liquid Disposal Area.

10. Comment, page 40, paragraph 5, and page 41: BIEC states that one extraction well pumping at a rate of 15 gpm for 10 years at the eastern end of the Liquid Disposal Area would be sufficient to remove 90 percent of the VOCs in the Liquid Disposal Area.

    U.S. EPA Response: BIEC's proposed plan does not accomplish the same objectives as the vapor extraction system and dewatering techniques outlined in the FS. It does not address the source of contaminants in the unsaturated zone. Without remediation of the unsaturated zone source, continued release of VOCs to the aquifer is likely, causing continued contamination of the aquifer.

    In BIEC's proposal, the mean value of hydraulic conductivity for the upper aquifer across the site was used and not the measured value at monitoring well CH09, located approximately 100 feet east of the Liquid Disposal Area, which is a more appropriate value. Pumping a single well at 15 gpm in an aquifer with material exhibiting a hydraulic conductivity 1.07 x 10^{-3} cm/s as measured at CH09 would cause the well to dewater completely in less than 45 minutes. As a result, the EPA does not agree that one well could create a capture zone large enough to control groundwater flow in the Liquid Disposal Area or produce enough to achieve a 90 percent contaminant reduction after 10 years as proposed. The actual number of wells and pumping rate must be determined during design.

11. Comment, page 42, paragraph 1: BIEC requests that the U.S. EPA adopt its proposed method of remediation for the Liquid Disposal Area.

    U.S. EPA Response: For reasons previously mentioned, the EPA cannot accept BIEC's proposed plan for remediation of the Liquid Disposal Area. We summarize our position as follows:

    - Information collected during the RI demonstrates unacceptable concentrations of VOCs in the unsaturated zone of the Liquid Disposal Area. It is the EPA's intent to reduce the mass (and consequently the mobility) of VOCs to reduce possible future recontamination of the aquifer. The EPA has selected vapor extraction, a proven, effective technology, as the method to achieve that objective. The EPA acknowledges BIEC's concerns relative to subterranean landfill fires that could develop during vapor extraction. Recognizing this concern, the EPA proposes pilot testing to evaluate the effectiveness of the system and to determine the design operating conditions.

    - BIEC does not provide sufficient information on soil flushing as an acceptable alternative to reduce the volume of VOCs in the unsaturated zone. The EPA believes vapor extraction is more appropriate.

    - BIEC used an inappropriate value of hydraulic conductivity when calculating the drawdown from its single pumping well and proposes a system too small to achieve its stated goal. However, the EPA recognizes that the number of wells and flow rates must be determined during the design.

Section 9.0--Groundwater Operable Unit

1. Comment, page 43, paragraph 2: BIEC states that the FS report lists Alternative D5--Incineration, Groundwater Pumping and Treatment, Capping--as an alternative addressing groundwater contamination.

U.S. EPA Response: It appears that information in the FS report has been misinterpreted. In the FS report, the Liquid Disposal Area and the groundwater were treated as a single operable unit. In Alternative D5 incineration was applied to the contents of the Liquid Disposal Area but not the groundwater, which would be collected and treated through other means. BIEC, in its comments, has elected to separate the Liquid Disposal Area and groundwater into two operable units and to address each individually.

2. Comment, page 44, paragraph 2: BIEC states the EPA's conceptual design criteria of minimizing aquifer drawdown to maximize aquifer remediation is inappropriate, and dewatering the upper aquifer will not significantly reduce the effects of remediation because the area of VOCs attenuated on the aquifer matrix is small.

   U.S. EPA Response: Minimization of drawdown to maximize aquifer remediation is an appropriate design criterion. The EPA's concern is that the proposed BIEC plan of rapidly dewatering the upper aquifer, particularly in the area of the Liquid Disposal Area, could result in unacceptable quantities of VOCs remaining adsorbed in the aquifer matrix after remediation has met cleanup criteria. These remaining constituents could serve as a continuing source of aquifer contamination. Before accepting such an aquifer remediation plan, BIEC must demonstrate to the EPA's satisfaction that the plan is capable of achieving the cleanup criteria. Also, if drawdown is not minimized, groundwater monitoring would be necessary for a longer period of time after cleanup criteria are met to determine if desorption from the dewatered aquifer matrix will cause cleanup criteria to be exceeded.

3. Comment, page 45, paragraph 1: BIEC states that offsite extraction wells are not required because groundwater that discharges to the Miami River will not affect surface water quality and that pumping close to the river will result in induced infiltration to the detriment of the system.

   U.S. EPA Response: It is the intent of SARA and EPA's position to reduce the toxicity and volume of contaminants in the groundwater. The Great Miami Valley Fill Aquifer has been designated a sole source aquifer in that it is the only source of drinking water to neighboring residents and communities. The EPA cannot permit the aquifer to remain contaminated regardless of the related effects on surface water quality.

4. Comment, page 45, paragraph 2: BIEC again questions the low pumping rates assumed in the FS report and the EPA's concern for minimizing drawdown and describes what it considers to be a more appropriate alternative.

   U.S. EPA Response: Minimization of drawdown, particularly in the central and western portions of the site that are being remediated, is a legitimate concern. Quickly dewatering a highly contaminated portion of the aquifer can cause contaminants to be left behind on the soil matrix, only to recontaminate the aquifer once the wells are shut down and the water levels in the aquifer recover. Drawdown achieved in the extraction wells in the upper aquifer at the site boundary, taking into account recharge, effects from other upper aquifer wells, and effects from lower aquifer wells, is approximately 3 feet. This was calculated using the hydraulic conductivity value (6.01×10^{-4} cm/s) obtained from piezometer P-5, which is located nearby, and not the site mean hydraulic conductivity (9.7×10^{-3} cm/s) that BIEC prefers to use. The self-induced drawdown of an upper aquifer well, pumping at 10 gpm, assuming no recharge, and assuming a site mean hydraulic conductivity (as the BIEC proposed), is great enough to cause that well to completely dewater in approximately 1 hour. Combined with the drawdown induced by other upper aquifer and lower aquifer wells, it would frequently be necessary to shut down the system to allow it to recharge.

   The EPA recognizes that the FS is not a design. The final number of extraction wells and the pumping rates will be determined during the remedial design.

5. Comment, page 46, paragraph 3: BIEC states that its proposed system will result in a shorter cleanup period than the EPA's proposed method but cannot directly compare the two because the FS report does not present the pore volumes used. BIEC also claims it cannot back calculate pore volumes because pumping rates presented on page D-3 do not match those on page D-7.

   U.S. EPA Response: The exact length of the cleanup period cannot be determined at this time. The cleanup period required will be a function of the final design and the cleanup criteria to be established. Therefore, the EPA feels that BIEC is premature in its conclusion that its proposed scheme will clean up the aquifer faster than the system presented in the FS report.

   The EPA acknowledges that the number of pore volumes used were not presented in the FS report but sees no reason why BIEC cannot back calculate the pore volumes from the data presented in Appendix D of the

FS report. Page D-3 of the FS report states a total withdrawal of 12 gpm from the upper aquifer and 60 gpm from the lower aquifer. On page D-7, in calculating cleanup periods, it is stated that 7 gpm is withdrawn from the upper aquifer and 27.5 gpm from the lower aquifer, west of County Highway 25-A. East of County Highway 25-A, a total of 35.5 gpm is withdrawn from both aquifers. The 35.5 gpm can be broken into a withdrawal of 5 gpm from the upper aquifer and 30.5 gpm from the lower aquifer. This reflects a total withdrawal of 12 gpm from the upper aquifer and 58 gpm from the lower aquifer (rounded to 60 gpm).

6. Comment, page 47, paragraph 1: Based on its analysis, BIEC requests that the U.S. EPA adopt its proposed groundwater extraction system as the remedy for its groundwater operable unit.

   U.S. EPA Response: BIEC's analysis is insufficient to warrant acceptance of its proposed plan as presented. The final extraction system will need to be determined in the design. Again, the numbers of wells and extraction rates presented in the FS report were developed to prepare order-of-magnitude cost estimates. The groundwater extraction system presented in the FS report was never intended as the EPA's final design. The appropriate system will be developed in the design stage and may require additional field investigations.

Section 10.0--Groundwater Treatment

1. Comment, page 48, paragraph 1: BIEC disputes the EPA's assertion that physical-chemical pretreatment of groundwater before air stripping will be temporary. BIEC states that such treatment will likely be needed over the life of the extraction system.

   U.S. EPA Response: The EPA has concluded that pretreatment would probably not be necessary over the life of the extraction system on the basis of low BOD_5, suspended solids, and inorganic constituent concentrations anticipated for the extracted groundwater. Routine maintenance cost estimates for the air stripper included acid washing to remove precipitated solids and chlorination to control biological growth. However, the need for permanent pretreatment will be reconsidered during the design if onsite treatment of groundwater is required.

2. Comment, pages 48 to 50: As an alternative to onsite treatment BIEC proposes that the Troy POTW be used to treat the extracted groundwater.

   U.S. EPA Response: The EPA does not object to BIEC's proposed treatment alternative providing BIEC can, over the life of the remedial action, demonstrate to the EPA's satisfaction that the Troy POTW can accept the quantity and quality of extracted groundwater and continue to meet all federal, state, and local regulations regarding acceptance, treatment, and discharge of wastewater (and resultant residuals).

Section 11.0--Summary of BIEC Plan

1. Comment, page 51, subsection 11.1: BIEC states that its proposed plan is fully protective of human health, consistent with the NCP and CERCLA as amended by SARA, and cost-effective. BIEC also states that its plan closely parallels the EPA's but differs in that BIEC proposes more reliable and cost-effective technologies.

   U.S. EPA Response: The EPA recognizes that BIEC's plan has many similar items to its own Proposed Plan. However, the EPA believes BIEC's plan is deficient in several areas as discussed throughout this Responsiveness Summary.

2. Comment, page 53, subsection 11.2: BIEC proposes a perimeter fence to prevent direct access to the site and deed restrictions to control potential future development of the site.

   U.S. EPA Response: This is consistent with the final remedy in the ROD.

3. Comment, page 53, subsection 11.3: An alternative water supply has been or will be provided to the affected properties downgradient of the site.

   U.S. EPA Response: This is consistent with the final remedy in the ROD.

4. Comment, page 53, subsection 11.4: A single-barrier cap should be provided for the South Landfill.

   U.S. EPA Response: Please see the response to BIEC comments in Section 4.0.

5. Comment, page 54, subsection 11.5: BIEC proposes a single-barrier cap for the North Landfill.

   U.S. EPA Response: Please see our responses to BIEC comments in Section 5.0.

6. Comment, pages 54 to 55, subsection 11.6: BIEC presents its proposed remedy for the Ash Disposal Pit and Ash Pile Operable Unit.

   U.S. EPA Response: Please see our responses to BIEC comments in Section 6.0.

7. Comment, page 55, subsection 11.7: BIEC presents its proposed remedy for its Scrubber Wastewater Lagoon and Stained Soil Area Operable Unit.

   U.S. EPA Response: Please see our responses to BIEC comments in Section 7.0.

8. Comment, page 55, subsection 11.8: BIEC presents its proposed remedy for the Liquid Disposal Area.

   U.S. EPA Response: Please see our responses to BIEC comments in Section 8.0.

9. Comment, page 56, subsection 11.9: BIEC presents its proposed remedy for its groundwater operable unit.

   U.S. EPA Response: Please see our responses to BIEC comments in Section 9.0.

10. Comment, page 56, subsection 11.10: BIEC proposes treatment of extracted groundwater at the Troy POTW instead of onsite treatment.

    U.S. EPA Response: Please see our responses to BIEC comment 2 Section 10.0.

11. Comment, pages 57 to 64, subsection 11.12: BIEC presents an "effectiveness monitoring program" for its proposed remedial action program.

    U.S. EPA Response: The EPA appreciates the efforts BIEC has taken to present its proposed long-term monitoring plan. The EPA considers this a design issue and will reserve its final judgment on any monitoring plan until that time.

12. Comment, subsection 11.14: BIEC presents a contingency plan to be followed should monitoring indicate the system is not operating as planned or should other developments occur that would compromise the effectiveness of the system.

U.S. EPA Response: Again, the EPA appreciates BIEC's efforts at this stage, but will reserve additional comments until later.

COMMENTS FROM THE PUBLIC MEETING

Technical Questions/Concerns Regarding Remedial Alternatives

1. Comment: Mr. Huffman's question was about the southerly flow of groundwater and contaminants. He was concerned that, while under normal flow conditions in the Great Miami River groundwater and contaminants are capable of flowing approximately three-quarters of a mile prior to discharge into the river, during high flow conditions the southerly flow of contaminants would extend further south and contaminate additional residential wells.

   U.S. EPA Response: It is true that during high flow conditions the southerly component of flow in the groundwater is increased, but it is also true that during low flow conditions the southerly component to flow is decreased. That is why the normal flow conditions were used: they represent the long-term process that is occurring. Flow of groundwater and contaminants at the site is governed by the hydraulic conductivity of the aquifer material and the hydraulic gradient measured across the aquifer. Assuming the hydraulic conductivity in the aquifer is fairly constant, the gradients will have the greatest effect on the flow of contaminants. Gradients across the site range from 0.002 to 0.003 ft/ft (1 foot per 333 feet to 1 foot per 500 feet) and are governed generally by recharge west of the site. Gradients in the aquifer below and nearest the Great Miami River are governed by the gradient of the river, approximately 1 foot per 1,500 feet or three to four times less than that of groundwater at the site.

   Although the gradient in the river is not constant, it is fairly stable and likely to decrease during high flow conditions. This means that contaminants move in the aquifer from the site to the river three to four times faster than they are able to move in the aquifer once they get to the river. Using a gradient of 1 foot per 1,500 feet and the average hydraulic conductivity for the site, groundwater flow velocities range from 30 to 40 feet per year under the river. Given such a low velocity, seasonal fluctuations in flow direction have only a very minor effect on the movement of the contaminants. The timely changes in the movement of contamination can be seen by comparing residential well data obtained in November 1984 and May 1985 with those collected by the Ohio EPA in October 1988, a 3-year span. These comparisons show that the contaminant distribution south of the site has changed very little, and, in fact, many contaminant concentrations have decreased to the south of the site during this 3-year period.

2. Comment: Mr. Pence asked how many gallons or barrels of waste were disposed of in the North Landfill. He also wondered what knowledge the EPA has regarding the generators of those wastes.

   U.S. EPA Response: Refer to the response to comment 2 for the BIEC letter dated April 26 for a discussion of the quantity of waste disposed in the landfills. As mentioned at the public meeting, the EPA has a list of tentatively identified responsible parties and is seeking information about parties who may have left industrial waste liquids at the site.

3. Comment: Mr. Brown asked the cost of the proposed alternatives.

   U.S. EPA Response: The total present worth of proposed Alternatives A3, B4, C4, and D4 is $21.9 million, and the total estimated capital cost is $15.6 million. Cost estimates are presented in the FS report under each of the different alternatives.

4. Comment: Mr. Brown also asked if the people of Troy could be given more than 60 days to respond to the EPA.

   U.S. EPA Response: The EPA is following a procedure set forth in Section 122(e) of CERCLA that specifies a 60-day time period for the PRPs to submit a proposal to the EPA to conduct or finance the remedial activities.

Remedial Alternative Preferences

1. Comment: Mr. Carlton (speaking for BIEC) summarized BIEC's preferred alternatives and highlighted their differences from the EPA's Proposed Plan.

   U.S. EPA Response: The EPA has carefully considered the preference of the BIEC in deciding on final remedy described in the ROD.

2. Comment: Representatives from the following local governmental agencies presented resolutions endorsing BIEC's plan:

   City of Piqua, William Cruse, Mayor
   City of Troy, Doug Campbell, Mayor
   Miami County Commission, Don Hart, Chairman
   Tipp City, Jess Chamberlain, City Council member

U.S. EPA Response: The EPA recognizes the support of these local governments for the BIEC plan.

3. Comment: The following citizens expressed their support for the BIEC plan:

Roy Carlson, Troy Chamber of Commerce
Robb Howell, Hobart Brothers
Jim Rasback, Hobart Brothers
Art Haddad, City of Troy
Rex McClure, Miami Industries
Greg Horn, Tipp City Manager
Larry Baker, Piqua Chamber of Commerce
Richard Adams, Upper Valley Joint Vocational School District
Bill Lukens, Stillwater Technologies
Keith Roeth, Edison State Community College

U.S. EPA Response: The EPA acknowledges the support for the BIEC plan.

OTHER WRITTEN COMMENTS RECEIVED

1. Comment: Resolutions were submitted on behalf of BIEC by:

Bethel Township
City of Tipp City
Miami County and Troy City Boards of Health
Miami County Council
Newton Township
Piqua Area Chamber of Commerce
Troy Area Chamber of Commerce
Union Township Board of Trustees
Village of Bradford
Village of Covington
Village of Ludlow Falls
Village of Pleasant Hill
Washington Township

U.S. EPA Response: The EPA appreciates tne efforts made on the behalf of BIEC.

2. Comment: Written comments in support of the actions proposed by BIEC were received by the following residents, businesses, and industries:

Dr. R. N. Adams, Upper Valley Joint Vocational School District
David L. Ault, Star Bank
Roy Baker, B-K Photo Products Company
Erich Borden
John P. Coleman, The Ohio Municipal League
John L. Dillon, French Oil Mill Machinery Company
W. McGregor Dixon Jr., City of Troy
James H. Dotson, French Oil Mill Machinery Company
William B. Eckstein
Thomas L. Elberson, Dinner Bells Foods, Inc.
R.J.M. Fisher, PMI Food Equipment Group
Dick Force, Jackson Tube Service, Inc.
Daniel P. French, French Oil Mill Machinery Company
John G. Grubb, Upper Valley Medical Center
Arthur D. Haddad, City of Troy
James R. Hartzell, Hartzell Industries, Inc.
Randall Hefelfinger
William H. Hobart, Hobart Brothers Company
Robb F. Howell, Hobart Brothers Company
John Hunt, Jackson Tube Service, Inc.
Charles F. Jacobs, RT Industries
William H. Kadel, The Fifth Third Bank of Miami Valley
Ray L. Loffer
Donald E. Lukens, Member of Congress, House of Representatives
Rex A. McClure, Miami Industries
Fred Meitz, American Plasma Tech
Norman Osting, Stanton Township Trustees
Aaron B. Parker, Friendly Ice Cream Corporation
Ernest F. Schaub, B.F. Goodrich Aerospace
John Suber, Ebberts Field Seeds, Inc.
Wilbur Sussman, Sussman, Inc.
James D. Utrecht, Shipman, Utrecht, and Dixon Company, L.P.A.

U.S. EPA Response: The EPA has taken the widespread support for the BIEC plan into consideration in selecting the final remedy described in the ROD.

3. Comment: The following people submitted written comments that claimed their inclusion in the list of PRPs was mistaken and stated that they were opposed to the PRP steering committee's (BIEC's) allocation of responsibility:

   Richard E. Pence, Pence Refuse Service
   Council of the Village of Pleasant Hill
   Thomas L. Elberson, Dinner Bell Foods, Inc.
   Theodore A. Boggs, Attorney for the Village of
   Covington

   U.S. EPA Response: As one of the commentators explained, "The CERCLA regulatory scheme is designed so that those responsible for the creation of hazardous sites will be required to pay for the resulting remedial response activities." CERCLA holds four categories of PRPs jointly and severally liable for toxic-material site cleanup costs: owners and operators of the site, owners and operators when the site received hazardous substance, those who produced and disposed of the hazardous substances, and transporters of the hazardous substances.

   The definition of "hazardous substance" contained in CERCLA Section 101(14) is very broad and requires only that a substance be designated as hazardous or toxic under one of several federal statutes. Further, if a waste material contains any hazardous substances, then the waste material is itself a hazardous substance under CERCLA. The quantity or concentration of the hazardous substance within the waste material is irrelevant to its hazardous substance designation.

   Unfortunately, it is unusual if not exceptional for municipally operated waste disposal operations to keep careful records concerning the disposal of materials containing hazardous substances. The weight tickets removed from the site are a primary source of information about the parties and nature of the wastes at the Miami County Incinerator site. Other sources of information linking PRPs with the site include various Miami County records, studies of municipal solid waste composition, and, of course, information obtained through CERCLA Section 104(e) information requests.

   Generally, PRPs prefer to develop a rationale for allocation of cleanup costs through the steering committee associated with the site rather than rely upon the U.S. EPA's assignment of liability. The basis for the allocation is usually worked out between the steering committee and other PRPs. At this site, the amount of hazardous substances contributed by individual PRPs may be difficult to ascertain because of the limited information provided by the site records. A consistent feature of the

Miami County records is the disposal costs stated on the weight tickets. The PRP steering committee may have proposed this method of allocation, in part, because determining the toxicity or exact amounts of hazardous substances individual parties disposed of may be not possible because of the nature of the site records. Therefore, any other method of allocation might be no more equitable than the present allocation system the BIEC recommends.

4. Comment: Mr. Pence's letter also mentioned he was informed that "the County had the ash pit [i.e., the Scrubber Wastewater Lagoon] cleaned out and dug it too deep, and tore the foot clay barrier out the bottom. One week later the well at the County Garage went bad."

   U.S. EPA Response: Historic documentation also supports the above claim that "while working on a settling lagoon the seal was broken; this eventually contaminated the incinerator well" (Brookhart, et al. 1976). As mentioned in the Proposed Plan, the Scrubber Wastewater Lagoon area will be tested during the remedial design activities to select a course of action to protect public health and the environment.

5. Comment: Keith L. Roeth expressed the need for prompt action.

   U.S. EPA Response: Pending the signing of a Consent Decree or the availability of federal funding, predesign and design activities will begin immediately.

6. Comment: Gary Wick expressed a concern with allowing the BIEC to perform the cleanup because many members of the BIEC are potentially responsible parties.

   U.S. EPA Response: Section 122(a) of CERCLA authorizes the EPA to enter into an agreement with any person, including any potentially responsible person, to perform any response action provided that the PRPs commit to such actions in a consent decree. The EPA encourages PRPs to conduct the response actions. The EPA will, however, provide review and oversight of such actions in accordance with Section 104(a)(1) of CERCLA.

7. Comment: One anonymous commentator expressed the desire for the EPA to test groundwater near a former open landfill located at 10315 North Springcreek Road near Piqua because of the high incidence of cancer deaths in the neighborhood near the former dump.

   U.S. EPA Response: U.S. EPA acknowledges the citizen's concerns, but this comment is not relevant to the RI/FS or Proposed Plan for the

Miami County Incinerator site. This matter has been referred to the Miami County Health Department.

COMMENTS FROM OHIO EPA

Comments from Ohio EPA were received in a letter dated April 4, 1989, and have been grouped by issues to facilitate response to them in this document. The reader is referred to the actual comments in the Administrative Record.

RI Data Evaluation

1. Comment: "Determination of background values for inorganics in groundwater (and for that matter, background values for soils) based on the upper 99.9% confidence interval of the mean is very misleading. For example, several monitoring wells which contain contaminated groundwater have values of specific conductance which are below 'background.' Background would be more appropriately established by using water quality data from monitoring wells located hydraulically upgradient of the site."

   U.S. EPA Response: Groundwater inorganic background concentrations were derived from wells located hydraulically upgradient of the site. As stated on page 5-13 of the RI report, "Background inorganic concentrations were determined using Phase I and Phase II RI results from upgradient monitoring wells MW01A, MW02A, and CH17A in the upper aquifer and MW01C and MW02C in the lower aquifer."

   The U.S. EPA acknowledges that there are various approaches to determining background concentrations for inorganic chemicals. We consider the approach taken (calculating the upper 99.9 percent confidence limit to the mean concentration for each constituent) an effective method for indicating the nature and extent soil or groundwater inorganic contamination. As stated in Appendix J of the RI report, "The final determination of acceptable inorganic concentrations is based on health effects as well as on background concentrations. Thus, the 99.9 percent confidence interval is used only in evaluating whether the presence of chemicals is a result of site activities and not as a final determination of acceptable concentrations."

   The U.S. EPA disagrees with the comment that implies that the determination of background concentrations is misleading because contaminated wells have specific conductance below background concentrations. Specific conductance indicates the presence of charged ionic species in solution, such as magnesium, calcium, iron, aluminum, potassium, bicarbonate, sulfate, and so on. These particular constituents were not presented in Figures 5-18 and 5-19 in the RI report because they are not indicative of health effects. Specific conductance provides an indication of total ion concentration and was presented to provide supplemental information with respect to water quality. It is incorrect to relate specific conductance to only a few of the ionic species detected in the groundwater.

The selection of soil samples used to derive background concentrations of inorganic chemicals is described on page 5-1 of the RI report. Although soil samples were collected from locations hydraulically downgradient from the Liquid Disposal Area, most were collected from the unsaturated zone and located away from known or suspected waste disposal areas. Therefore, no influence of waste disposal on soil inorganic chemistry should occur. This approach is considered valid and adequate to meet the objectives of the RI, namely site characterization.

2. Comment: Ohio EPA believes that since the proposed remediation of the Ash Pile, Ash Disposal Pit, and possibly the Scrubber Wastewater Lagoon would involve the excavation and consolidation of surface and near-surface soils, background concentrations for inorganic chemicals in those soils would be more appropriately determined by surface and near-surface soils in areas unaffected by site activities. "The RI lumped soils together from a wide range of depths and soil horizons to determine background concentrations. Ohio EPA feels it is inappropriate to determine background concentrations in this manner, and therefore, additional surface and near-surface soil sampling during predesign is warranted."

   U.S. EPA Response: The determination of background inorganic soil concentrations is used to assess the relative nature and extent of contamination. The determination of background as calculated in the RI adequately serves as a measure for the comparison and evaluation of soil data. U.S. EPA acknowledges that additional sampling will be necessary to define the extent of removal.

3. Comment: Ohio EPA questioned why water level measurements were not obtained from wells CH08A and CH08B on April 18, 1988, and requested an explanation for an earlier water level measurement of 828.96 feet, which is below the bottom of the well screen at 829.23 feet.

   U.S. EPA Response: Clarification with regard to this comment was inadvertently omitted from the RI report. No water level measurements were obtained at CH08A because the well was dry at the time of sampling. At CH08B, complications with the lock on the protective casing prevented obtaining a water level measurement. Monitoring well

CH08A was constructed with a 3- to 4-inch end cap on the bottom of the well screen, as were most of the wells installed at the incinerator site. The water measured in CH08A on October 19, 1987, is believed to have been trapped in the end cap and, thus, not reflective of the actual water table.

4. Comment: Ohio EPA states that groundwater flow in the upper aquifer during flood conditions is to the southwest, and not "southerly," as stated on page 1-5 of the FS report and illustrated in Figure 4-7 in the RI report.

   U.S. EPA Response: Figure 4-7 in the RI report is a hydrogeologic cross section that does not indicate groundwater flow direction. Figure 4-14 presents water level contours for the upper aquifer based on data obtained in November 1985 during flood conditions. As seen on Figure 4-14, the flow direction changes under flood conditions and flows in a southwesterly direction from the river toward the site. Flow direction changes back to the east and southeast after flood stages subside.

Endangerment Assessment

1. Comment: Ohio EPA expressed concern that Figures 7-4 and 7-5 "do not give a complete picture of carcinogenic risks for exposure to groundwater since they do not include a summation of the excess lifetime cancer risks for inhalation and ingestion. These maps, aside from being inconsistent with Figures 2-1 and 2-2 of the feasibility study, are also inconsistent with USEPA's own risk assessment guidance and directives which call for, among other things, the summation of risks across exposure routes."

   U.S. EPA Response: The two figures are intended to illustrate the risks associated with groundwater ingestion. They are labeled as a summary of ingestion risk and not a summary of total risk. Inhalation risks are presented in the text and may be summed with the ingestion risk. Combined risks for the various exposure settings are presented on Table 7-19. These figures are not inconsistent with the FS figures, they merely illustrate somewhat different issues.

2. Comment: Ohio EPA feels that Table 7-17 is misleading because it provides what appear to be acceptable levels of chemicals that could be left in soils at the site. "While target concentrations may be useful for the identification of 'hot spots', they should not be used as cleanup goals."

   U.S. EPA Response: The intent of the table, as stated in both the text and the table, was to illustrate health-based target concentrations for single chemicals in a single media as a way of indicating "hot spots." The values presented are not cleanup goals.

3. Comment: Table I-27 of the draft and RI report, entitled "Well MW03C--Comparison of Daily Intakes to RfDs," should have been included in the final RI report.

   U.S. EPA Response: The table was inadvertently excluded from the final report and is included in Attachment A.

4. Comment: Tables I-88B and I-89B, "Comparison of Daily Intakes to RfDs for the North Landfill Excluding Ash Pile" and "Comparison of Daily Intakes the RfDs for the Liquid Disposal Area," should also have been included in the final RI report.

   U.S. EPA Response: The tables were inadvertently excluded from the final report and are included in Attachment A.

Remedial Alternative Preferences

1. Comment, FS report, page 2-4: Ohio EPA states that the remedial action objectives for the Liquid Disposal Area to minimize further contaminant migration from the soil or wastes to a drinking water aquifer should not be to solely prevent the degradation of groundwater to levels exceeding Maximum Contaminant Levels (MCLs). Emphasis should be on preventing degradation beyond levels sufficiently protective of human health and the environment.

   U.S. EPA Response: The U.S. EPA has not restricted the remedial objectives to attainment of MCLs, but has specified MCLs in one of the several Liquid Disposal Area objectives because MCLs are an enforceable standard for drinking water aquifers. The EPA believes that the remedial action objectives for both the Liquid Disposal Area and the groundwater adequately address the reviewer's concern for the protection of human health and the environment.

2. Comment: Several comments from Ohio EPA state that cleanup of groundwater to levels more stringent than MCLs is warranted and that cleanup of groundwater should be to background, to MCLGs, or to a 1×10^{-6} lifetime cancer risk level.

   U.S. EPA Response: The U.S. EPA acknowledged these comments and took them into consideration in establishing the cleanup goals described in the ROD. The EPA would like to clarify that cleanup goals were not set in the FS report, as implied by some of Ohio EPA's comments. The area targeted for groundwater remediation was defined as the area where groundwater contaminant concentrations exceeded MCLs, but that should not be interpreted as the cleanup criteria for the extracted groundwater. Similarly, calculations based on a 90 percent contaminant reduction of selected compounds were used to estimate the length of time required to remediate the aquifer system. This was done for comparison of alternatives and was not intended to suggest that MCLs are the cleanup criteria.

3. Comment: Ohio EPA stated with respect to Table A-2 in the FS report that it is misleading to use "target" concentrations for determining cleanup levels for soil "because they do not take into account exposures from multiple chemicals or multiple exposure routes. These target concentrations also do not account for potential leaching of contaminants from soils and their release into the groundwater."

   U.S. EPA Response: The U.S. EPA acknowledges the comment and would like to point out that, as the title of the table says, they are "guidelines to be considered." The FS report does not establish the concentrations as cleanup levels. The basis for the extent of soil removed is addressed in the ROD.

4. Comment: Ohio EPA states that the Proposed Plan should specify the cleanup levels for soils that will remain after wastes from the Ash Pile, Ash Disposal Pit, and possibly the Scrubber Wastewater Lagoon area are consolidated into the North Landfill.

   U.S. EPA Response: The extent of soil removal is defined in the ROD. It is the intent of EPA to protect human health and the environment.

5. Comment: Ohio EPA understands that for costing purposes the FS assumed a passive landfill gas venting system, but feels a passive system may not be sufficiently effective for venting landfill gases.

   U.S. EPA Response: EPA recognizes this comment and notes that the appropriateness of a passive or active landfill gas collection system will be evaluated during predesign or design.

6. Comment: Ohio EPA does not feel that the groundwater monitoring proposed on page B-7 of the FS report is adequate for a number of reasons. "First, to establish baseline water quality in both aquifers, most if not all of the monitoring wells, both on and off-site, will need to be sampled and analyzed for TCL organics and inorganics including cyanide. (Cyanide was never analyzed for in any site media during the RI.) Second, with the need to monitor two aquifers under any selected

alternative, the monitoring of only nine wells would appear to be grossly inadequate to track plume movement, ensure capture, and measure shrinkage of aquifer contaminant concentrations. Adequate groundwater monitoring of the south landfill unit is also important since sampling of soils from below the water table in borings adjacent to the south landfill showed levels of toluene ranging from 65 ug/kg to 1600 ug/kg. This is a strong evidence for indicating a release of organic contaminants to the groundwater from the south landfill and emphasizes the need for adequate groundwater monitoring. Third, Ohio EPA feels that due to the lack of groundwater quality data in the area between the southern property boundary and well clusters MW-03 and MW-06, additional wells must be installed and sampled in this area."

U.S. EPA Response: As stated, the groundwater monitoring program discussed was presented for cost estimating purposes. The monitoring program is defined in the ROD and addresses Ohio EPA's concerns.

Editorial Remarks

1. Comment, FS Report, page 1-11, paragraph 1: Ohio EPA states that 11 residential wells and not 10 as stated in the FS report were sampled in October 1988. The reviewer questions why the Miami County Health Department was the reference for this information rather than the Ohio EPA.

   U.S. EPA Response: The data indicate that 12 samples were collected from 11 different residential wells. One sample was a duplicate. The FS report referenced the County Health Department because the EPA contractor writing the FS initially received the information from that agency.

2. Comment, FS report, page 1-12, paragraph 3: Ohio EPA states that the results of the endangerment assessment indicate that the Ash Pile, Ash Disposal Pit, Liquid Disposal Area, and groundwater are sufficiently contaminated to present "actual risks" to the public as well as potential risks.

   U.S. EPA Response: As stated in Chapter 7 of the RI report, it is necessary to make several assumptions (e.g., exposure concentrations, exposure setting human intake, population characteristics, toxicity) to estimate human health risk for carcinogenic and noncarcinogenic effects.

   The risk assessment is subject to uncertainty with respect to estimating risk and regarding the understanding of site conditions. Thus, "potential" is a more appropriate term than "actual" when referring to calculated risk values.

3. Comment, FS report, page 1-12, paragraph 5: Compounds such as PCBs and the pesticide dieldrin were also found in the sediment of the Eldean Tributary in addition to polynuclear aromatic hydrocarbons (PAHs). "Therefore, predesign sediment sampling should also include analysis for pesticides and PCBs to determine if these compounds are attributable to the site and could pose a risk to public health or the environment."

   U.S. EPA Response: The comment is correct and recognized by EPA.

4. Comment, FS Report, page 2-5, paragraph 3: Trichloroethene was detected in MW06A in rounds 1 and 2, not 1 and 3. Also, N-nitrosodiphenylamine was detected in well MW03A during sampling round 3.

   U.S. EPA Response: The comment is correct and recognized by EPA.

5. Comment, FS report, page 2-6, paragraph 2: Figures 2-1 and 2-2 show the excess lifetime cancer risks estimated for both ingestion and inhalation of groundwater.

   U.S. EPA Response: The comment is correct and recognized by EPA.

6. Comment, FS report, page 3-6, paragraph 1: The second to last sentence mentions the "EPA guidance document" but does not name the document.

   U.S. EPA Response: The reference "(U.S. EPA 1982)" should be added to the second to last sentence.

7. Comment, FS report, page 3-20, paragraph 2: It is unclear what "Agency" is being referred to in this sentence.

   U.S. EPA Response: The word "Agency" refers to the U.S. EPA.

8. Comment, FS Report, page 4-2, paragraph 4: The last sentence is unclear.

   U.S. EPA Response: The word "overloaded" should read "reviewed."

9. Comment, FS report, Table A-1: The following chemicals were omitted from the column "compounds detected in groundwater": 1,1-dichloroethene (1,1-dichlorethylene), 1,2-dichloroethene, and 2-methyl

naphthalene. The footnote stating that the SDWA MCLs indicated by an asterisk are proposed values as of October 1986 is misleading since those values have been promulgated as final standards.

U.S. EPA Response: The comment is correct and recognized by the EPA.

10. Comment, FS report, Table A-2: This table is inconsistent with Table 7-17 in the RI report with respect to carcinogenic risk levels for the compounds bis(2-ethylhexyl)phthalate, chlordane, 1,1-dichloroethane, dieldrin, and PCBs.

    U.S. EPA Response: The inconsistencies are noted; Table 7-17 is correct.

11. Comment, FS report, Attachment B-1: A key to the unit quantity symbols is requested.

    U.S. EPA Response:

    CF = cubic foot
    CY = cubic yard
    DY = day
    EA = each
    GAL = gallon
    HR = hour
    KW = kilowatt
    LB = pound
    LF = linear foot
    LS = lump sum
    MG = million gallons
    MO = months
    F = square foot
    SY = square yard
    YR = year

12. Comment, FS report page D-10: Figure D-5 was omitted from the report.

    U.S. EPA Response: The reference in the text to Figure D-5 should read "(refer to Figure 4-5)."

13. Comment, Proposed Plan, page 14: It is unclear what is considered to be offsite in the statement that "VOC groundwater contamination offsite is expected to be reduced by 90 percent or more within 15 years in the upper aquifer and about 8 years in the lower aquifer."

    U.S. EPA Response: The Proposed Plan and Table 5-8 of the FS report need to be clarified. The pumping of the onsite downgradient wells (see Figure 4-2) was estimated at about 15 years for the upper aquifer and about 8 years for the lower aquifer. The offsite downgradient wells were estimated to operate for about 5 years. As stated in the FS report, estimates of time to achieve contaminant reductions are presented for comparative purposes. They are based on many simplifying assumptions and, as a result, actual times may be substantially different than those presented.

REFERENCES

Board of Commissioners of Miami County, Ohio. Resolution Establishing Rules and Regulations for Disposal of Solid Wastes in Miami County Garbage and Refuse Disposal District Number 1, September 6, 1968.

N. Brookhart. Miami County, Ohio, Miami County Incinerator Cost Analysis, March 25, 1970.

N. Brookhart, W. T. Burkhart, and J. L. Shoemaker. Memorandum from a Miami County Incinerator general information meeting, September 20, 1976.

GLT883/013.50

Attachment A
TABLES I-27, I-88B, AND I-89B FOR THE REMEDIAL INVESTIGATION REPORT
MIAMI COUNTY INCINERATOR SITE
TROY, OHIO

Table 1 - 27
COMPARISON OF ESTIMATED DAILY INTAKE TO REFERENCE DOSE
MONITORING WELL 3C: ROUND 1
MIAMI COUNTY INCINERATOR SITE

Chemical	Reference Dose (RfD)[a] mg/kg/day	Concentration ug/l	Ingestion: Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose
Barium	0.05	130	0.0037	0.074	NO
Manganese	0.22	169	0.0048	0.022	NO
Methylene Chloride	0.06	6.7	0.0002	0.003	NO
Zinc	0.21	34	0.0010	0.005	NO
Hazard Index (Sum of DI/RfD)				0.104	

EXPOSURE ASSUMPTIONS

Exposure Setting	Residential
Exposed Individual	Adult
Water Intake (liters/day)	2
Body Weight (kilograms)	70

Chemical	Reference Dose (RfD)[a] mg/kg/day	Concentration ug/l	Inhalation: Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose
Methylene Chloride	0.06 b	6.7	0.0003	0.005	NO
Hazard Index (Sum of DI/RfD)				0.005	

EXPOSURE ASSUMPTIONS: Assumes inhalation exposures are 150% of ingestion exposures.

a Source: IRIS database (U.S. EPA 1988); HEA/HEED Quarterly Update (U.S. EPA 1988); or Superfund Public Health Evaluation Manual (SPHEM) (U.S. EPA 1986).

b No inhalation exposure: based on ingestion RfD.

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Table 1.88B
COMPARISON OF ESTIMATED DAILY INTAKE TO REFERENCE DOSE (RfD)
SOIL INGESTION - ADULT TRESPASS
MIAMI COUNTY INCINERATOR SITE

North Area (excluding ash pile and liquid disposal area)

Chemical	Reference Dose (RfD)[a] mg/kg/day	Highest Detected Concentration ug/kg	Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose
Barium	0.05	102000	0.000146	0.003	NO
Chromium III	1	54000	0.000077	0.000	NO
Chromium VI	0.005	54000	0.000077	0.015	NO
Copper	0.037	38000	0.000054	0.001	NO
Lead	0.0014	120000	0.000171	0.122	NO
Manganese	0.22	841000	0.001201	0.005	NO
Mercury (alkyl)	0.0003	830	0.000001	0.004	NO
Mercury (inorganic)	0.002	830	0.000001	0.001	NO
Nickel	0.02	37000	0.000053	0.003	NO
Vanadium (pentoxide)	0.02	30000	0.000043	0.002	NO
Zinc	0.21	304000	0.000434	0.002	NO
Hazard Index (Sum of DI/RfD)				0.159	

EXPOSURE ASSUMPTIONS

Exposure Setting	Trespass
Exposed Individual	Adult
Soil Intake (grams/day)	0.1
Body weight (kilograms)	70

a Source: IRIS data base (U.S. EPA 1988), HEA/HEED Quarterly Update (U.S. EPA 1988), or Superfund Public Health Evaluation Manual (SPHEM) (U.S. EPA 1986)

Table 1-89B
COMPARISON OF ESTIMATED DAILY INTAKE TO REFERENCE DOSE (RfD)
SOIL INGESTION - CHILD TRESPASS
MIAMI COUNTY INCINERATOR SITE

North Area (excluding ash pile and liquid disposal area)

Chemical	Reference Dose (RfD)[a] mg/kg/day	Highest Detected Concentration ug/kg	Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose
Barium	0.05	102000	0.000291	0.006	NO
Chromium III	1	54000	0.000154	0.000	NO
Chromium VI	0.005	54000	0.000154	0.031	NO
Copper	0.037	38000	0.000109	0.003	NO
Lead	0.0014	120000	0.000343	0.245	NO
Manganese	0.22	841000	0.002403	0.011	NO
Mercury (alkyl)	0.0003	830	0.000002	0.008	NO
Mercury (inorganic)	0.002	830	0.000002	0.001	NO
Nickel	0.02	37000	0.000106	0.005	NO
Vanadium (pentoxide)	0.02	30000	0.000086	0.004	NO
Zinc	0.21	304000	0.000869	0.004	NO
Hazard Index (Sum of DI/RfD)				0.318	

EXPOSURE ASSUMPTIONS

Exposure Setting	Trespass
Exposed Individual	Child
Soil Intake (grams/day)	0.1
Body Weight (kilograms)	35

a. Source: IRIS data base (U.S. EPA 1988), HEA/HEED Quarterly Update (U.S. EPA 1988), or Superfund Public Health Evaluation Manual (SPHEM) (U.S. EPA 1986).

APPENDIX C

ADMINISTRATIVE RECORD INDEX UPDATE
MIAMI COUNTY INCINERATOR SITE
TROY, OHIO

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	2	00/00/00	Response to Request for Information.	Charles Hobart-Hobart Cabinet Co.	USEPA	Correspondence	
	1	00/00/00	Response to Request for Information.	H & M Construction Co.	USEPA	Correspondence	
	2	66/10/28	Dept. of Health has approved plans for a proposed incinerator and facilities for treatment of liquid wastes generated from the operation of the incinerator subject to listed conditions.	E.W.Arnold-Ohio Dept. of Health	Miami Co. Commissioners	Correspondence	
	2	72/10/17	Notice that the landfill areas at the rear of the incinerator are no more than open dumps at the time of the inspection. A request is made for the submission of a written plan of action stating the counties intention for up-grading the landfill operation.	L.Domigan-Troy/Miami Co.Health Dept	Nick Brookhart-Miami Co.	Correspondence	
	3	72/12/01	Recommendation that the Miami County Health District remain on the list of approved solid waste disposal programs. A summary of findings and recommendations is included in this letter.	Richard Simms-OEPA	K.Becker-MiamiCo.HealthDe	Correspondence	
	2	73/05/11	Review of the landfill operation as prompted by a citizens complaint. An inspection determined that the conditions complained about continue to exist. Also, the author states that unless the landfill is designed and operated as an engineering plan continual problems could	Richard Sims-OEPA	Orley-MiamiCo.HealthDept.	Correspondence	

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			be expected.				
	3	73/06/11	Notice of improvements and corrections that have been made at the Miami Co. Solid Waste Disposal Site. Several suggestions are made that should further improve the site conditions.	Charles Forsthoff-OEPA	Miami Co. Board of Comm.	Correspondence	
	1	73/10/15	Agreement that there appears to be some contamination in a ditch across from letter recipients home and they will inspect the area again in the future.	Charles Oxley-Miami Co.Health Comm.	Thomas Thorpe	Correspondence	
	2	73/11/14	Notice that the present waste disposal practices present an "extreme hazard to groundwater" and dumpers must be informed to find an alternate disposal methods.	M.Joe Moore-OEPA	Oxley-Miami Co.HealthDept	Correspondence	
	4	73/12/10	Copies of lab analyses of well samples collected on 10/31/73.	M.Joe Moore-OEPA	Oxley-Miami Co.HealthDept	Correspondence	
	1	74/03/05	Notice that liquid wastes will no longer be accepted at the Miami County Incinerator.	Nick Brookhart-Miami Co. San.Eng.	See service list	Correspondence	
	3	75/02/26	Notice to recipient, accompanied by the latest landfill inspection forms, that Miami Co. must cease to accept their liquid waste material.	N.Brookhart-Miami Co.San.Eng.Dept.	Schwabel-ValDeckerPacking	Correspondence	
	2	76/02/27	Listing of the contents	Charles Cramer-Hobart Bros.	Robert Brown-OEPA	Correspondence	

ADMINISTRATIVE RECORD INDEX UPDATE
MIAMI COUNTY INCINERATOR SITE
TROY, OHIO

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			of the authors paint for possible disposal in the Miami Co. Landfill.	Co.			
	1	76/03/12	Follow-up to request for assistance in locating an acceptable land disposal site for waste sludge materials collected from paint booths.	M.Joe Moore-OEPA	C.Cramer-Hobart Bros. Co.	Correspondence	
	1	76/03/29	Determination that, assuming the continuation of good operations and maintenance practices, that should prevent the recipient from staying in compliance with their NPDES Permit.	Gary Bramble-OEPA	R.F.VanDorpe-B.F.Goodrich	Correspondence	
	2	76/05/24	Letter confining main points as discussed over the telephone on 5/21/76. Those points are: 1) The Miami County Landfill is not approved for the disposal of liquid industrial wastes, 2) I.W.D. Liquid Waste, Inc. is a company that handles industrial liquids and sludges and to the OEPA's knowledge is making every effort to handle these materials in the best practical manner, 3) Systech Waste Treatment Centers have experience in treating the wastes in question.	M. Joe Moore-OEPA	M.Phillis-St.RegisPaperCo	Correspondence	

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ADMINISTRATIVE RECORD INDEX UPDATE
MIAMI COUNTY INCINERATOR SITE
TROY, OHIO

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	2	76/09/14	Notice that the OEPA, after an investigation, does not recommend that the site be used for a sanitary landfill purpose.	Abdul Rashidi-OEPA	Nick Brookhart-Miami Co.	Correspondence	
	3	77/12/23	Due to groundwater pollution from wastes deposited in the gravel terrain, the author recommends: 1) Discontinue disposal of wastes in the landfill & lagoons 2) Cover the landfill and incinerator ash disposal areas with two feet of clay 3) Drain and fill the lagoons with clay soils.	James Pennino-OEPA	Miami Co. Board of Comm.	Correspondence	
	4	78/03/20	Annual survey of the Miami County Health District's solid waste disposal program. It is recommended that Miami County Health District remain on the list of approved solid waste disposal programs.	M. Joe Moore-OEPA	C.M.Orley-Miami Co.Health	Correspondence	
	1	78/07/17	Letter confirming earlier conversation where Miami Co., upon closing the incinerator, would also abandon the landfill and incinerator scrubber lagoon. Letter states the OEPA's concerns on how the scrubber water lagoon and the incinerator residue will be handeled.	James Pennino-OEPA	N.Brookhart-Miami Co.Eng.	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	1	78/10/12	Miami County plans to take the fly ash that remains in the fly ash lagoons and spread it on top of the incinerator residue after the residue has been graded.	Nick Brookhart-Miami County	James Pennino-OEPA	Correspondence	
	1	79/04/30	Letter urging recipient not to use the former Miami County Landfill Site to dispose of demolition and highway materials.	Lowell Domigan-Pub.HealthSan.Admin.	Trissell-San.Eng.MiamiCo.	Correspondence	
	2	80/06/27	Results of investigation of disposal of foundry sand on the recipients property.	M. Joe Moore-OEPA	Floyd Avey-Avey Services	Correspondence	
	1	80/07/22	Determination that S.P.M. Corp. foundry sand is not a regulated solid waste and is not required to go to a licensed sanitary landfill nor recieve special state approval.	Joe Moore-OEPA	Robert Wahl-Avey Services	Correspondence	
	1	80/11/24	Request for information about proper disposal methods for waste alcohol from two area hospitals.	Robert Wahl-Avey Services	Joe Moore-OEPA	Correspondence	
	1	80/12/03	Request for a letter from the OEPA giving permission to use waste oil for dust control and an explanation of current policies regarding this practice.	Robert Wahl-Avey Services	Joe Moore-OEPA	Correspondence	
	1	80/12/15	Reply to request regarding the regulatory status of	Joe Moore-OEPA	Robert Wahl-Avey Services	Correspondence	

ADMINISTRATIVE RECORD INDEX UPDATE
MIAMI COUNTY INCINERATOR SITE
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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			waste oil and its use as a dust control agent.				
	1	81/01/06	Request for assistance in finding disposal options for 300 gallons each of paint and varnish along with 200 gallons of wash water.	Robert Wahl-Avey Services	OEPA	Correspondence	
	1	81/02/05	Response to request to the OEPA for help in determining possible disposal options for paint and varnish remover. OEPA cannot adequately respond to this request until additional information is provided.	Thomas Winston-OEPA	Robert Wahl-Avey Services	Correspondence	
	1	81/05/09	Recommendation that the air quality above wells at the County Tranfer Station and at the County Garage be sampled. Letter also transmits a copy of a chemical analysis from the last time the wells were sampled (not present).	James Pennino-OEPA	Miami Co. Board of Comm.	Correspondence	
	1	81/05/15	Notice that air samples will be taken at the Miami Co. Garage and the Miami Co. Transfer Station for the purpose of determining the degree of air quality contamination caused by well water supplies.	Stanley Trissell-Miami Co. San.Eng.	D.Christian-Miami Co.Eng.	Correspondence	
	1	82/04/30	Review of waste streams from hospitals located in Piqua and Troy, Ohio.	David Strayer-OEPA	F.Avery:E-colo-G Recyclin	Correspondence	

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MIAMI COUNTY INCINERATOR SITE
TROY, OHIO

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Letter also states that the recipient can properly handle these wastes.				
	1	87/02/24	Preliminary Natural Resources Survey.	Bruce Blanchard-U.S.Dept.ofInterior	Gene Lucero-USEPA	Correspondence	
	1	88/07/29	Response to recent BIEC correspondence indicating recipient may be a PRP.	R.Leininger-Indutrial Waste Dis.	G. Rayburn Pruitt-BIEC	Correspondence	
	2	88/09/29	Response to Request for Information.	Floyd Avey-Avey Services,Inc.	Virginia Sorrells-USEPA	Correspondence	
	2	88/11/18	Laboratory results of water sample obtained from recipients well.	Michael Starkey-OEPA	Steve Depugh	Correspondence	
	19	88/11/21	Laboratory results of water samples obtained from wells of local residents and one local business.	Michael Starkey-OEPA	See documents	Correspondence	
	9	88/12/30	Response to Request for Information.	John Simmons-Laidlaw Waste Systems	Virginia Sorrells-USEPA	Correspondence	
	4	89/02/17	Response to Supplemental Request for Infomation.	R.Leininger-Industrial Waste Dis.	Thomas Geisbecker-USEPA	Correspondence	
	2	89/02/24	Narrative of activities of author company's subsidiaries with respect to the site.	Ivan Cairns-Laidlaw Transportation	Mary Fulgham-USEPA	Correspondence	
	2	89/02/27	Additional information on state applicable or relevant and appropiate requirements (ARARs).	Michael Starkey-OEPA	Anthony Rutter-USEPA	Correspondence	
	1	89/03/22	Reason for lack of response to recent BIEC correspondence.	Floyd Avey-Avey Services,Inc.	Business&IndustryEnv.Comm	Correspondence	
	45	89/03/27	Special Notice Letter.	Norman Niedergang-USEPA	See service list	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	2	89/03/28	Response to Request for Information.	Lamar Delaney-Simpson & Delaney Ser	USEPA	Correspondence	
	5	89/04/05	Response to Request for Information.	Louis Cruz-Roper Industries, Inc.	Tony Rutter-USEPA	Correspondence	
	1	89/04/10	Response to Request for Information.	Don Hubbard-Hubbard Roofing, Inc.	Tony Rutter-USEPA	Correspondence	
	1	89/04/10	Response to recent USEPA correspondence.	Floyd Avey-Avey E-colo-G Recycling	Tony Rutter-USEPA	Correspondence	
	2	89/04/10	Reason for not responding to recent USEPA correspondence.	Floyd Avey-Avey Services	Tony Rutter-USEPA	Correspondence	
	3	89/04/10	Response to Request for Information by the counsel for Grissom's Super Value.	J.Richard Gaier-J.Richard Gaier Co.	Tony Rutter-USEPA	Correspondence	
	4	89/04/13	Letter formalizing the good-faith offer made by the BIEC.	Mildred Wright-BIEC	Tony Rutter-USEPA	Correspondence	
	2	89/04/17	Response to Request for Information.	Dimitri Nicholas-Orr Felt Co.	Tony Rutter-USEPA	Correspondence	
	3	89/04/19	Response to Request for Information.	Gary Crouth-Aluminum Co. of America	Tony Rutter-USEPA	Correspondence	
	2	89/04/19	Response to Request for Information.	Robert Honigford-Peterson Construct	Tony Ritter-USEPA	Correspondence	
	2	89/04/21	Response to Request for Information.	C.Kessler-City Transfer & Storage	Tony Rutter-USEPA	Correspondence	
	4	89/04/24	Response to Request for Inforation.	D.French-French Oil Mill Machinery	Tony Rutter-USEPA	Correspondence	
	2	89/04/24	Response to Request for Information.	Max Schaefer-The Schaefer Co., Inc.	Mary Fulgham-USEPA	Correspondence	
	2	89/04/25	Response to Request for Information.	Alan Kaiser-Carpenter Construction	Tony Rutter-USEPA	Correspondence	
	2	89/04/25	Response to Request for Information.	Arthur Disbrow-Hartzell Propeller	Tony Rutter-USEPA	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	2	89/04/25	Response to Request for Information.	B.Uchitelle-ConsolidatedGrain& Barge	Tony Rutter-USEPA	Correspondence	
	3	89/04/25	Response to Request for Information.	Donald Kiefer-Benning Constructors	Tony Rutter-USEPA	Correspondence	
	2	89/04/25	Response to Request for Information.	James Alley-Piqua City School Dist.	Tony Rutter-USEPA	Correspondence	
	4	89/04/25	Response to Request for Information.	John Owen-Prototype Technology,Inc.	Tony Rutter-USEPA	Correspondence	
	7	89/04/25	Response to Request for Information.	Larry Ewald-Process Equipment Co.	Tony Rutter-USEPA	Correspondence	
	5	89/04/25	Response to Request for Information by counsel for Dinner Bell Foods, Inc.	Michael Cyphert-Thompso,Hine&Flory	Tony Rutter-USEPA	Correspondence	
	4	89/04/25	Response to Request for Information.	R.L.Barton-Aerovent Inc.	Tony Rutter-USEPA	Correspondence	
	4	89/04/25	Response to Request for Information.	Richard Pohl,Jr.-Henry Stock & Son	Tony Rutter-USEPA	Correspondence	
	2	89/04/26	Response to Request for Information.	D.Grieshop-The Fifth Third Bank	Tony Rutter-USEPA	Correspondence	
	2	89/04/26	Response to Request for Information.	Gregg Karlos-Hammer Graphics, Inc.	Tony Rutter-USEPA	Correspondence	
	55	89/04/26	Response to Request for Information.	K.Anselment,Jr. - A.O. Smith Corp.	Tony Rutter-USEPA	Correspondence	
	6	89/04/26	Response to Request for Information.	Kenneth Cleveland-Industry Products	Tony Rutter-USEPA	Correspondence	
	4	89/04/26	Response to Request for Information.	Phillip Pierucci-Keyes Fibre Co.	Tony Rutter-USEPA	Correspondence	
	3	89/04/27	Response to Request for Information.	Houston Turner-Medalist Industries	Tony Rutter-USEPA	Correspondence	
	8	89/04/27	Response to Request for Information by the counsel for Sussman, Inc.	James Shenk-Blake,Faulkner,et al.	Tony Rutter-USEPA	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	3	89/04/27	Response to Request for Information.	Robert Roberts-Chemlawn	Tony Rutter-USEPA	Correspondence	
	1	89/04/27	Response to Request for Information.	William Lukens-Stillwater Technolog	Tony Rutter-USEPA	Correspondence	
	8	89/04/28	Response to Request for Information.	Melinda Kemp-Champion International	Tony Rutter-USEPA	Correspondence	
	4	89/04/28	Response to Request for Information.	Robert Tate-Cyclops Industries,Inc.	Tony Rutter-USEPA	Correspondence	
	3	89/04/29	Response to Request for Information.	William Janning-ARC Abrasives	Tony Rutter-USEPA	Correspondence	
	52	89/05/01	REsponse to Request for Information.	B.A.Steiner-ARMCO Inc.	Tony Rutter-USEPA	Correspondence	
	2	89/05/01	Response to Request for Information by the counsel for Ferguson Construction Co.	John Garmhausen-Blake,Faulkner,etal	Tony Rutter-USEPA	Correspondence	
	4	89/05/01	Response to Request for Information by the counsel for the Village of Pleasant Hill, Ohio.	Michael Gutmann-McCulloch,Felger,..	Tony Rutter-USEPA	Correspondence	
	7	89/05/02	Response to Request for Information.	Douglas Maynor-Goodson Polymers,Inc	Tony Rutter-USEPA	Correspondence	
	7	89/05/02	Response to Request for Information.	Gregory Horn-Tipp City, Ohio	Tony Rutter-USEPA	Correspondence	
	2	89/05/02	Response to Request for Information.	L.Edward Fry-Trojan Asphalt,Inc.	Tony Rutter-USEPA	Correspondence	
	4	89/05/02	Additional response to Request for Information.	William Janning-ARC Abrasives	Tony Rutter-USEPA	Correspondence	
	6	89/05/03	Response to Request for Information by the counsel for Evenflo Juvenile Furniture Co.	Andrea Evans-Butler & Burnette	Mary Fulghum-USEPA	Correspondence	
	8	89/05/04	Response to Request	Aaron Parker-Friendly Ice	Tony Rutter-USEPA	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			for Information.	Cream			
	3	89/05/04	Response to Request for Information.	Paul Lazorski-Elder Berman Stores	Tony Rutter-USEPA	Correspondence	
	5	89/05/05	Response to Request for Information.	Darrel Neely-ConAgra, Inc.	Tony Rutter-USEPA	Correspondence	
	6	89/05/08	Response to Request for Information by the counsel for Beatreme.	Berghoff&MacAyeal-Mayer,Brown& Platt	Fulgham & Rutter-USEPA	Correspondence	
	2	89/05/08	Response to Request for Information.	James Hartzell-Hartzell Industries	Tony Rutter-USEPA	Correspondence	
	5	89/05/08	Response to Request for Information by counsel for Enterprise Roofing & Sheet Metal.	James Jacobson-Jacobson,Durst,et al	Tony Rutter-USEPA	Correspondence	
	8	89/05/11	Response to Request for Information.	Snell & McFarland-Tipp Machine&Tool	Tony Rutter-USEPA	Correspondence	
	5	89/05/12	Response to Request for Information.	Kay McKinney-Villiage of Covington	Tony Rutter-USEPA	Correspondence	
	5	89/05/17	Response to Request for Information.	Bernard Hurst-Ohio Dept. of Trans.	Tony Rutter-USEPA	Correspondence	
	5	89/05/17	Response to Request for Information.	Ralph Hitchcock-Dolly, Inc.	Tony Rutter-USEPA	Correspondence	
	1	89/06/15	Acknowledgement of good-faith offer recieved from the Business and Industry Environmental Committee (BIEC).	Norm Niedergang-USEPA	Mildred Woryk-BIEC	Correspondence	
	5	89/06/19	Letter concerning the remedy to the site. BIEC contest that a single barrier cap rather than a double barrier cap will satisfy all requirements for protection of the health and environment.	Charles Tisdale-King & Spalding	Fulgham & Rutter-USEPA	Correspondence	
	16	89/06/21	Information relating to	D. Lane-Keating,Muething &	Mary Fulgham-USEPA	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			the waterline project and the requirement that a new transfer station be built. Also included is a diagram indicating where the waterline will be located as well as a list people who have, will or could be connected to the waterline.	Klekamp			
	4	84/09/00	Superfund Program Fact Sheet - Miami County Incinerator Site Troy, Ohio Remedial Investigation/ Feasibility Study.	USEPA		Fact Sheet	
	6	89/04/00	Fact Sheet - "Remedial Investigation and Feasibility Study Completed at the Miami County Incinerator Superfund Site Troy, Ohio".	USEPA		Fact Sheet	
	2	76/09/20	Miami County Incinerator General Information Meeting.	Nick Brookhart-Sanitary Engineer		Memorandum	
	1	81/10/08	Request for an investigation of activities at Avery Services, Troy, Ohio.	Joe Moore-OEPA	Dave Strayer-OEPA	Memorandum	
	2	84/10/09	Trip Report for Miami Co., Incinerator RI/FS kick off meeting 9/27/84.	Margaret McCue-USEPA	File	Memorandum	
	1	84/09/18	"USEPA To Brief Citizens On Superfund Actions Scheduled For Former	USEPA		News Release	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Troy, OH, Landfill And Incineration Site"				
	2	89/03/24	News Release "USEPA, Ohio EPA Propose $21.9 Million Clean-up For Miami County Incinerator; Hearing Set For April 16".	USEPA		News Release	
	81	00/00/00	Annual Total Tonnage for the years 1973 to 1978.	Miami Co.		Other	
	1	00/00/00	Notice of a public meeting to be held on 4/6/89 to discuss remedial alternatives and invites written comments to be submitted no later than 4/26/89.	USEPA		Other	
	1	72/07/01	New incinerator rate schedule.	Miami Co.		Other	
	2	76/12/16	Commercial Hauler Permit Application.	R. Ferguson - Brown Bridge Mills	Miami Co. Commissioners	Permit	
	2	78/01/04	Commercial Hauling Permit Application.	C.T.Riker-Rikers Heating Service	Miami Co. Commissioner	Permit	
	4	78/01/06	Commercial Hauler Permit Application.	Troy Iron & Metal Co., Inc.	Miami Co. Commissioners	Permit	
	2	78/02/03	Commercial Hauler Permit Application.	W.B.T., Inc.	Miami Co. Commissioners	Permit	
	2	78/02/15	Commercial Hauler Permit Application.	R. Ferguson - Brown Bridge Mills	Miami Co. Commissioners	Permit	
	1	79/01/10	Commercial Hauler Permit Application.	SCA of Dayton, Ohio.	Miami Co. Commissioners	Permit	
	4	78/12/03	ORDER in the Matter of: Miami County Incinerator.	Ned Williams-OEPA	Miami County	Pleadings/Orders	
	5	67/11/01	"Notes On Inspection Of Solid Waste Program For Miami County"	Oscar Singer-Solid Waste Section		Reports/Studies	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	9	70/04/02	Summary of costs incurred for operation of the incinerator for the year 1969. Also enclosed is a cost analysis for the year 1970.	Nick Brookhart-Sanitary Engineer	Miami Co.Municipal League	Reports/Studies	
	1	73/10/31	Sanitary Landfill Inspection Form.	Donald Hiser	Miami County	Reports/Studies	
	3	73/11/02	Ground Water Evaluation For The Miami County Incinerator And Landfill.	Dave Johe-OEPA		Reports/Studies	
	1	74/11/01	Sanitary Landfill Inspection Form.			Reports/Studies	
	2	78/01/31	Miami County, Ohio Solid Waste Disposal Facility Operational Report.	Nick Brookart-Miami Co.SanitaryEng.		Reports/Studies	
	9	80/02/11	"Analysis of Leachate From Process Waste Solids - Hobart Brothers Company"	Pollution Control Science,Inc.		Reports/Studies	
	2	81/01/16	Report of Investigation Hobart Brothers Waste Disposal Site - Miami County.	James Pennino-OEPA		Reports/Studies	
	21	83/05/25	Hazard Ranking System Scoring Package.	Tom OntkoOOEPA	USEPA	Reports/Studies	
	8	87/02/13	Health Assessment.	David Mellard-ATSDR	Louise Fabinski-USEPA	Reports/Studies	
	28	87/11/18	"Municipal Solid Waste Landfills-The Role Of Industrial Wastes In Those Landfills"	Unocol Corp.		Reports/Studies	
	220	89/02/22	Remedial Investigation Report - Volume 1 of 2.	CH2M Hill	USEPA	Reports/Studies	
	316	89/02/22	Public Comment	CH2M Hill	USEPA	Reports/Studies	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Feasibility Study Report.				
	460	89/02/22	Remedial Investigation Report - Volume 2 of 2.	CH2M Hill	USEPA	Reports/Studies	
	19	89/03/00	Proposed Plan.	USEPA		Reports/Studies	
	3	89/06/19	Ohio EPA Recommendations For Soil Testing.	OEPA		Reports/Studies	
	317	89/06/29	Responsiveness Summary.	CH2M Hill	USEPA	Reports/Studies	
	63	89/04/06	Transcript of a Public Hearing held at the Troy Junior High School on 4/6/89.			Transcript	

USEPA ADMINISTRATIVE RECORD SAMPLING/DATA INDEX FOR THE
MIAMI COUNTY INCINERATOR SITE. DOCUMENTS HAVE NOT BEEN
COPIED BUT ARE AVAILABLE FOR REVIEW AT THE
USEPA REGION V OFFICES, CHICAGO, ILLINOIS.

DATE	TITLE	AUTHOR	DOCUMENT TYPE
00/00/00	Raw data and data summaries.	USEPA	Sampling/Data
00/00/00	Chain-of-Custody forms.	USEPA	Sampling/Data
00/00/00	Miami County Incinerator Database Source Documents. Forty four rolls of microfilm of all weight tickets removed from the site.	Conestoga-Rovers	Sampling/Data

GUIDANCE DOCUMENTS INDEX-SUPPLEMENT TO THE ADMINISTRATIVE RECORD INDEX FOR THE MIAMI COUNTY INCINERATOR SITE TROY, OHIO. DOCUMENTS HAVE NOT BEEN COPIED BUT ARE AVAILABLE FOR REVIEW AT THE USEPA REG.V OFFICES, CHICAGO,IL.

DATE	TITLE	AUTHOR	DOCUMENT TYPE
00/00/00	To be considered - proposed legislation in the State of Ohio "Final Closure Of Sanitary Landfill Facilities - Draft".	OEPA & State of Ohio	Guidance
00/00/00	Delegation of Remedy Selection to Regions.	USEPA	Guidance
00/00/00	Superfund Community Relations Policy	USEPA	Guidance
80/12/29	Interim Guidelines and Specifications for Preparing QAPP's.	USEPA-QAMS-005/80	Guidance
82/07/01	RCRA Guidance Document: Landfill Design Systems and Final Cover.	USEPA	Guidance
82/08/00	Users Guide to the USEPA Contract Laboratory Program.	USEPA	Guidance
82/09/00	Interim Standard Operating Safety Guides.	USEPA	Guidance
83/09/08	Guidance Memorandum on the Use and Issuance of Administrative Orders Under Section 106 of CERCLA.	USEPA	Guidance
85/02/12	CERCLA Compliance with other Environmental Statutes.	USEPA	Guidance
85/05/01	Settlement and Cover Subsidence of Hazardous Waste Landfills: Project Summary.	W.L.Murphy&P.A.Gilbert-USEPA	Guidance

GUIDANCE DOCUMENTS INDEX-SUPPLEMENT TO THE
ADMINISTRATIVE RECORD INDEX FOR THE MIAMI COUNTY INCINERATOR
SITE TROY, OHIO. DOCUMENTS HAVE NOT BEEN COPIED BUT ARE
AVAILABLE FOR REVIEW AT THE USEPA REG.V OFFICES, CHICAGO,IL.

DATE	TITLE	AUTHOR	DOCUMENT TYPE
85/06/00	Guidance on Remedial Investigations/ Feasibility Studies Under CERCLA.	USEPA	Guidance
85/08/01	Toxicology Handbook.	OSWER 9850.2	Guidance
85/11/22	Endangerment Assessment Guidance (Secondary Reference).	OSWER 9850.0-01	Guidance
86/00/00	Interim CERCLA Settlement Policy.	USEPA - 50 Fed Reg 5034 (1986)	Guidance
86/09/24	Guidelines for Exposure Assessment.	USEPA-Fed Reg p.34042 - 9/24/86	Guidance
86/10/01	Superfund Public Health Evaluation Manual.	OSWER 9285.4-1	Guidance
87/00/00	Evaluating Mixed Funding Agreements Under CERCLA.	53 Fed Reg 8279 - J. Winston Porter	Guidance
87/06/01	Guidelines and Specifications for Preparing Quality Assurance Project Plans.	USEPA	Guidance
87/06/30	Interim Guidance on De Minimus Settlements.	52 Fed Reg 24333	Guidance
88/04/01	Superfund Exposure Assessment Manual.	OSWER 9285.5-1	Guidance
88/05/06	Region V Groundwater Strategy.	Adamkus & Covington-USEPA	Guidance
88/06/01	Community Relations In Superfund: A Handbook (Interim Version).	OSWER 9230.0-03B	Guidance
88/10/01	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA.	OSWER 9355.3-01	Guidance
88/11/17	Guidance on Premium Payments In CERCLA Settlements.	OSWER 9835.6 - Adams/Porter USEPA	Guidance

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E	TITLE	AUTHOR	DOCUMENT TYPE
7/00	Draft RCRA Guidance Document: Landfill Design Liner Systems And Final Cover.	USEPA	Guidance